GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

A Great National Endeavour.

By the time these lines come to the notice of readers of the "JOURNAL," the 1929 British Industries Fair will be in full swing, and the Gas Industries Section will have been admired by visitors from all parts. It is a matter of great gratification to us to see our industry playing so important a part in a great national endeavour. As was rightly remarked by Mr. R. C. Rodgers (President of the Birmingham Chamber of Commerce) at the luncheon during the Press view of the Fair: "If the present rate of taxation is to be borne, both employers and employees must "take off their coats." And in the doing of this, the important gas industry is not to be left behind. If, as the speaker urged, the Fair stands for more employment and greater production, what industry could be more fittingly represented in it than gas, which can assist both aims in such numberless directions?

Not only is the gas display good, but it is truly national, and not in any sense parochial; and from this point of view the industry should regard it. The thought may have been harboured in the early days that the Heavy Section of the British Industries Fair was more or less a Birmingham exhibition; but each year as it has grown in size and importance, it has come to be recognized more and more as a national event. The very fact that so many thousands of buyers in every industry represented are visiting the Fair shows the vital importance of the gas industry being adequately represented; for these other sections include hardware, engineering, and numerous trades in which gas is already largely used, and can be still further employed to an indefinite extent.

The gas industry has begun this good work; and there must be no thought of turning back. This year the Castle Bromwich (Birmingham) Section of the Fair covers 11 acres, and has gangways which would extend to something like 3½ miles in a straight line. Already the largest building in the British Isles, there is, however, to be still further extension next year. Indeed, according to Mr. G. N. Guest (Chairman of the Fair Management Committee), it is believed that in five years' time or less the Fair will be double its present size. The opportunity which thus presents itself yearly, manufacturers are beginning to realize is well worth the expenditure of money and time involved in suitably staging their exhibits. One notices on many of the stands that new inventions and apparatus are shown for the first time; and therefore all those connected with the industry who wish to keep themselves well informed as to the latest and best in these directions should make a point of visiting the Fair.

The Gas Industries Section is a striking example of grouping, and illustrates the unity of purpose of the manufacturers and administrators in the gas industry. It is, in fact, the only group in the Fair that is clearly defined by a definite colour scheme and type of stand. In such a huge exhibition this clear marking of the confines of a particular group is most desirable, since it is absolutely impossible for a visitor on any one occasion to inspect the whole of the display.

Monthly Bills.

PROBABLY many of the very large number of proprietors who attended last week's meeting of the South Metropolitan Gas Company looked forward with particular interest to hearing something further about the system which was instituted nearly a year ago of monthly meter inspecting and account rendering. They were not disappointed, for the President (Dr. Charles Carpenter, M.Inst.C.E.) told them exactly what they must have desired to know—that the Directors had no reason whatever for departing from the system which they had laid down. Complaints about the change from the quarterly to the monthly system have been received from but a very small proportion of the huge number of consumers, and of these few dissentients some are already altering their views.

This monthly system of meter reading and account rendering has so lately been fully described and illustrated in our pages that there is no reason now to repeat the details. It possesses many interesting features, and, as we have ventured to think, presents great possibilities. There must be decided advantages, which should appeal in instances in which there are not preponderating disadvantages. The President declared that in the case of the South Metropolitan Company the new system has proved a great success; and there must be many undertakings very similarly circumstanced. The question of additional costs naturally comes to mind; but in South London, at any rate, it has been satisfactorily answered. As was said in the oft-quoted chapter on "Snakes in Iceland"—"There are none."

Dr. Carpenter is of opinion that monthly accounts should increase the popularity of gas, by reason of the greater facilities which are thus afforded of checking wasteful consumption. This appears to be a sound argument; and, in addition to it, there is the consideration which was advanced in our editorial columns a week ago—that it is not unreasonable to expect each of three accounts covering a period of one month to be, because of the greater ease of settlement, a little more than one-third of a quarterly account. It may be argued that this is a mistaken view, because, after about nine months' experience of the new system, the Company are not able to point to an increase in total consumption. The demand for gas is, however, so largely influenced by climatic conditions—which in the period referred to were not conducive to abnormal outputs—that this absence of increase cannot be accepted as conclusive evidence. It would be just as reasonable to assert that, under quarterly accounts, the

small percentage of decrease shown would have been greater. In other lines of business, which possibly in certain respects are somewhat better adapted to it, one finds the system of monthly accounts growing in favour; and we believe that in certain parts of the world it is still more prevalent than is yet the case in this country.

The various respects in which coal cleaning is of importance to the gas industry were pointed out by Dr. Carpenter; and as will be seen from our report of the meeting, he also dealt with the arrangements for the production of low-temperature coke.

For East is East.

HAD the Metropolitan Gas Companies been making their twelve months' accounts up to the end of next month, instead of to the last day of 1928, what a different tale there would have been to tell the proprietors. In the place of the effects of mild periods which have not made for excessively large gas demands, there would have been occasion for dilating upon the driving force in the direction of increased gas consumption of one of the severest spells of low-temperature conditions that have been experienced in this country for many years past. Instead of stationary or only slightly augmented business, undertakings in different parts of the country are just now reporting extraordinary increases.

Apart from some unavoidable difficulties which follow in the wake of the severe frost, these abnormal requirements are satisfactorily met. With the provision that the gas industry is able to make, such eventualities do not find it unprepared. How very different is the case of the electrical industry. To them a spell of arctic weather such as we have been having brings literally "cold comfort." No rejoicing there, over additional heating appliances being brought into use. On the contrary, it has not been an entirely unknown thing for an electricity undertaking to plead to be saved from its friends. A too generous employment of radiators, &c., has even threatened unpleasant results. This acute difficulty in dealing with widely varying loads is, of course, one of the great disadvantages under which electricity labours; and there is small desire on our part to "rub it in." The desire would be even smaller were it not for the determination of some opponents of gas to concede nothing in its favour. However, this is by the way; and, after all, the electrical undertakings may obtain a better load curve when all the farmers in the country take to milking their cows by electricity.

What we have in mind at the moment is to refer to the meeting of the Commercial Gas Company, at which Mr. W. G. Bradshaw, C.B.E. (the Chairman), pointed to some of the peculiar circumstances which apply to this undertaking. Climatic conditions, of course, had their effect upon gas sales; and in East London such sales are peculiarly susceptible to temperature variations by reason of the large quantities of gas sold to the tailoring industry. The mild weather of October and November resulted in the loss of a great part of the winter trade; and even the present cold snap is regarded as unlikely to make good the whole of the loss, which was aggravated by the illness of the King. But the falling off in sales was a trifling one only, which the figures for the present year promise soon to wipe out. Another feature of the Commercial Gas Company is that it is surrounded by the districts of other undertakings; but though thus hemmed in, it possesses the decided advantage of being a compact area. It is pleasing to note the Chairman's opinion that the business prospects of East London are promising.

Times have been hard; and the unavoidable effects of excessively high rates have been felt. A number of Councils in the Company's area have made themselves notorious by their extravagant expenditure; and it is none too soon that substantial savings in this direction have been effected. In a district which, as we learn, is so largely given over to the tailoring trade, there should be particular aptness in reminding those in authority of the necessity of "cutting one's coat in accordance with one's cloth." Neglect of this elementary principle drove many manufacturers from the district. What other result could reasonable beings have anticipated? Capital is a plant which flourishes only in a suitable soil; and business enterprise will better thrive under encouragement than under discouragement. Rates of 25s. and 26s. in the pound are good neither for capital nor for business enterprise.

Better Street Lighting by Gas.

THE revived interest in the lighting load, which is so marked in the gas industry to-day, is by no means misplaced. This statement has added point when public lighting is the subject under consideration, for in this field the peculiar advantages possessed by gas render it pre-eminent. In the first place, gas is the most reliable of all illuminants—ancient and modern—and there is no need for us to dwell upon what this means to public safety, to general commerce, and to transport. Secondly, it is cheaper than any of its rivals on the basis of light for light *plus* maintenance charges and installation costs. Finally—to cut short our argument—the low intrinsic brilliancy of the incandescent mantle makes gas lighting comparatively glareless.

The more one studies the question, the more perplexed one becomes in endeavouring to formulate any satisfactory reason why for several years the gas industry has not more enthusiastically forced home to lighting authorities these exceptional advantages. Can it positively be asserted that every avenue has been explored, that each individual feature of gas lighting has been fully exploited? Or has there been in some quarters lack of faith, or a pleasantly casual attitude towards maintenance of lamps in those instances where the gas undertakings themselves have been wholly responsible for their efficient operation?

These thoughts arise after reading a pregnant article by Mr. Robert Watson, of Doncaster, which is published in this issue of the JOURNAL. It is a contribution which demonstrates what can be accomplished when ingenuity and inventive skill are brought to bear on a particular attribute of gas lighting—the one, already mentioned, of low intrinsic brilliancy, which allows of the best and most economic application of directive illumination. And we go so far as to say that, if this particular advantage were properly exploited, in the manner attempted with such marked success at Doncaster, then the lighting of many streets to-day would, at the same cost, be greatly in advance of current practice.

Our readers are familiar with the Street Lighting Specification recently issued by the British Engineering Standards Association. Class H of this Specification, which is the lowest rating of all, and is intended to apply only to roads and streets where there is little through traffic, gives a mean test-point illumination of 0·01 foot-candle. If, however, a census were taken of many stretches of gas lighting in "through" thoroughfares, we should be surprised if the results showed that more than 50 p.ct. of the mileage was either equal to, or above, this rating. The question arises, Can this be remedied without increasing the cost of the light given? For many cases a satisfactory answer may be found in the article by Mr. Watson. He describes his experiments in this respect in streets in Doncaster, and explains how, by the incorporation of Holophane refracting plates, the illumination was increased not merely along the diagonal line between the lamps, but also along the central axis of the roadway. With these refracting plates otherwise wasted light is controlled, and no light is re-directed from any one point of the street surface to another.

Directive lighting has one disadvantage; it may produce glare. Fortunately, as Mr. Watson points out, street illumination by gas lamps is obtained from several mantles, each having a relatively low intrinsic brilliancy and yielding diffused rather than concentrated light. In other words, the gas mantle is a particularly appropriate source of illumination for directive lighting. The conditions as to mounting heights and spacing ratios—mounting height, of course, having a marked bearing on glare production—in the Doncaster streets in which Mr. Watson's tests were carried out are not in accordance with the provisions of Class H of the "B.E.S.A." Specification; and yet, without alteration of existing lamp positions, illumination along the road surface has been considerably increased by the simple use of these refracting plates. The directive lighting, moreover, has not resulted in any appreciable glare. Indeed, motorists and pedestrians alike have expressed their satisfaction with the better distribution of light.

Frost and Gas Bills.

During this Siberian weather, gas is being consumed in enormous quantities; and it is due largely to gas service that the health and comfort of the vast majority of people in this country are being maintained. Many are the expressions of appreciation of gaseous heat when the mercury in the thermometer climbs slowly from 24° to 26° Fahr. only to fall again rapidly. The question which is exercising us, however, is whether, when consumers receive their accounts early in April, they will then recognize so readily the service which they received for their money. When the sun is shining, and the weather is warm, people are apt to forget that gas gave them warmth and comfort during the cold winter days—a fact which was mentioned by Mr. C. Valon Bennett, the Engineer, General Manager, and Secretary of the Rochester, Chatham, and Gillingham Gas Company, at the annual meeting on Friday last. In this respect, of course, monthly accounts show to great advantage. The South Metropolitan Gas Company will certainly feel the benefit of them this year, for Dr. Charles Carpenter, the President, at the annual meeting of the Company last week, stated that on Feb. 12 they sent out 36 p.ct. more gas than on the corresponding day of last year. This, needless to say, is no isolated case. Speaking at the annual meeting of the Croydon Gas Company, Mr. William Cash, the Chairman, said that from Jan. 1 to Feb. 14 inclusive gas sales had been increased by 77 million c.ft., which was approximately double the entire increase of 1928 over 1927. The output for last Wednesday and Thursday showed an increase of 70 p.ct. on the sales made during the corresponding days of 1928.

Gas Light and Coke Company's Record Output.

The past week has witnessed an altogether unprecedented use of gas for heating and cooking purposes. The works of the Gas Light and Coke Company have been operating at mid-winter capacity all through the week; and it is fortunate for the many thousands of homes, as well as business premises, which depend entirely on gas for heating, hot water supply, and cooking, that the stocks of gas and of coal and oil for manufacturing it, and the capacity of the works, have been equal to a demand that has exceeded the heaviest demand in the coldest and foggiest days of any December or January in the Company's history. The maximum output of the Company's works in any previous week was recorded in the seven cold and very short, dark "Christmas shopping days" ended Dec. 21, 1927—namely, 1445 million c.ft., and the maximum day's output in that week was 226 million c.ft. For the week ended yesterday the output was 1587 millions—an increase of 467 millions, or 41·7 p.ct., over the output for the corresponding week last year. The daily figures have beaten all records one day after another; being for Tuesday, Feb. 12, 232 millions, Wednesday 232·5 millions, Thursday 232·7 millions, Friday 240·5 millions, Saturday 218·8 millions, Sunday 198·8 millions, and Monday 231·4 millions. It has required a consumption of over 70,000 tons of coal, over 10,000 tons of coke, and one million gallons of oil to produce this enormous make of gas, which is enough to boil 3000 million quart kettles! That the demand has been not only for warmth for rooms, but for the cooking of hot meals to a more than usual extent, is shown by the fact that between 12 and 1 o'clock in the day the output has exceeded 17 million c.ft., while the average for the 24 hours has been in the neighbourhood of 10 millions. In brief, London has had an ample supply of therms to minister to its comfort, and has made good use of this supply.

Pressure Holders.

The paper on "Gasholders" which Mr. R. J. Milbourne contributed to the proceedings of the Joint Gas Conference at the British Industries Fair yesterday was a remarkable summary of the progress which has been made, particularly of recent years, in this field of gas engineering. Of the greatest interest are his remarks on the latest type of holder, the Hortonsphere; and his chart showing the sizes and capacities of Hortonspheres will be most useful. Automatic working; low maintenance costs; absence of working parts; minimum surface area, all of which is accessible; low costs for painting; pleasing appearance; flexibility—these are some of the advantages of the pressure holder mentioned by Mr. Milbourne. That early developments in pressure storage are to take place in this country is evident from the speech of Dr. Charles Carpenter at the annual general meeting of the South Suburban Gas Company last Friday. He mentioned that the area of the Company is a straggling one, and that sole reliance on the method of distributing gas direct from the works must necessitate mains of undue capacity in order to transmit sufficient gas to meet the peak load demands. The alternative, he said, lies in local storage, and in particular pressure storage, which system the Company intend to put into practice at Welling.

Advertising Lighting Fittings.

The enterprise of the Cardiff Gas Company in regard to the lighting load, as exemplified in a catalogue of lighting fittings which has been sent to us by Mr. H. D. Madden, the Engineer and Manager of the Company, might well be followed by other gas undertakings. The catalogue itself is an artistic production, and it is explained that the lighting appliances are fixed without additional charge, and can be paid for on hire-purchase terms. Information is included on the cleaning and adjustment of inverted gas burners.

Output Under the Five Counties Scheme.

The following official statement has been issued by Mr. Philip Gee for and on behalf of Messrs. Peat, Marwick, Mitchell, & Co., the Secretaries of the Central Collieries Commercial Association (commonly known as the Five Counties Scheme): It has been observed that, in statements which have recently been made in the Press and elsewhere, there is a misconception as to the degree to which the output of coal has been curtailed by the operations of the Central Collieries Commercial Association. Members of the public may have seen references to monthly "quotas" ranging from 56 to 70 p.ct., and may therefore have thought these figures represented drastic reductions from the production prior to the commencement of the Central Association. These "quotas" are merely factors in a formula, and are not related to actual output produced in any past year. The following figures show the total tonnage actually raised at all collieries in the districts affected by the Central Association in 1927 and 1928: Year ended Dec. 31, 1927, 109,660,065 tons; year ended Dec. 31, 1928, 102,641,235 tons. This decrease of 7,018,830 tons is equivalent to 6·4 p.ct. for the whole year.

Surveyors and Burst Mains.

A Special Committee has been set up by the Surveyors' Institution to consider and report on the dangers recently experienced in London from breaks in gas and water mains, and the possibility of taking protective measures. The Committee, consisting of seven Chartered Surveyors, will have its first meeting this week under the Chairmanship of Mr. E. J. Silcock, a member of the Council of the Surveyors' Institution, and Consultant to the Leeds Corporation on matters of water supply.

Compulsory Use of Fertilizers.—It is reported that the Hungarian Ministry of Agriculture is preparing legislation to render compulsory the use of artificial fertilizers. It is stated that over half of the larger farmers in Hungary do not use any artificial fertilizers.

Coke Ovens for Flexible Operation.—To increase the flexibility of their equipment, an American firm have re-arranged the regenerators in their balance-draught coke oven design. When heating with coke oven gas, only the air passes through the regenerators, and a single chamber suffices. To permit the use of producer gas, or even of blast-furnace gas, for heating the oven, when there is a demand for coke oven gas for open-hearth furnace or other uses, the regenerators under the new arrangement are split into two parts; one being placed above the other. With this arrangement, whereby both the air and the heating gas for the ovens are separately regenerated, it becomes possible to utilize all of the coke oven gas for sale either to other departments or outside the plant. The ovens are still built with the usual gas duct and nozzles for oven gas, but can be switched over quickly from the use of one gas to the other as requirements demand. This adaptation does not change the essential features of the heating system, though it permits of greater flexibility.

PERSONAL.

We are informed that Mr. F. H. ARNOLD, the Engineer, Manager, and Secretary of the Guernsey Gas Light Company, Ltd., has decided to retire in the near future, after over fifty years' service with the Company—the last twenty-seven of which have been spent in the management. The Directors expressed their great regret when this intention was made known to them, and exhausted every avenue in an endeavour to get Mr. Arnold to reconsider his decision. However, they had no alternative but to accede to his wishes, and to place on record the very great esteem in which he was held by them, and their appreciation of the able manner in which he had conducted the Company's business. They also voted him a handsome honorarium. Needless to add, during his association with the Company, Mr. Arnold has seen some very remarkable changes on both works and district. When he joined the Company the annual output of gas was 50 millions, while to-day it is 190 millions, and the number of consumers has risen from 1600 to 6050. The up-to-date policy always followed has resulted in many alterations and extensions of works being carried out during Mr. Arnold's association with the control; the latest addition just completed being a new 500,000 c.ft. spirally guided gasholder erected by Messrs. Samuel Cutler & Sons, Ltd., of Millwall. Mr. R. G. LUXON, who joined the Guernsey Gas Light Company as Assistant Manager some four years ago, and who was formerly for eleven years Engineer, Manager, and Secretary at Launceston, has been appointed by the Board to succeed Mr. Arnold; and an advertisement is now appearing in our columns for an Assistant Manager.

When, in last week's "JOURNAL," congratulating Mr. A. W. BROOKES upon his election to the Board of the British Gas Light Company, Ltd., it was inadvertently stated that this followed upon half-a-century of Secretaryship. As a matter of fact, Mr. Brookes has been in the service of the Company for close upon fifty-one years, for twenty-one years of which he has been Secretary.

Mr. ALEX. D. KING, for fourteen years Assistant at Bo'ness Gas-Works, West Lothian, has been appointed Manager in place of Mr. A. MACKIE, who has resigned. Mr. King, who has already taken up his new duties, is a son of the late Mr. John King, who for twenty-one years was Manager of the Bo'ness Gas-Works.

Mr. W. VINCENT WAITE, O.B.E., formerly Chief Engineer and General Works Manager of Messrs. Robert Heath & Low Moor Iron Company, Ltd., has been appointed General Manager of Sensible Heat Distillation, Ltd. ("L & N" process).

OBITUARY.

Mr. PERCY GEORGE WINSTANLEY, an announcement of whose death, on Feb. 11, appeared in last week's "JOURNAL," was the son of the late Mr. William Winstanley, formerly Engineer and Manager of the Newcastle-under-Lyme (Staffs.) Gas Department, and a nephew of the late Mr. George Winstanley, of Coventry. He was educated at Newcastle-under-Lyme Grammar School, and received his training in the gas profession under his father. His first appointment was at Halesowen, from where he went to Nuneaton. In April, 1898, he was appointed Engineer and Manager of the Wolverhampton Gas Company, in succession to the late Mr. John Annan. Deceased was of a most retiring disposition, and took no active part in the various organizations connected with the industry. He had been in rather poor health for the past twelve months, but his death at the age of 62 was unexpected. Among those who attended the funeral service, which took place at Codsall Parish Church on Feb. 13, were Messrs. J. W. Tilley (Vice-Chairman of the Company), A. G. Williams (Secretary), W. G. S. Cranmer (Midland Association of Gas Engineers and Managers), and W. S. Simmonds (Midlands Salesmen's Circle).

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later pages.]

THERE is very little doubt that the volume of Stock Exchange business diminished considerably during the past week.

In the Gas Market there were a few upward movements; Liverpool 5 p.ct. ordinary advanced 1½ points, and Tottenham ordinary 1 point. Continental Union, after the slight set-back, moved up again 3 points to 120-125, and Primitiva shares made another jump of 1s. to 27s. 6d.-29s. 6d. It will be noticed that Imperial Continental capital stock reacted 10 points to 390-410. The interest being taken in this stock is very fascinating, the latest development being the announcement that the Association, which was established in the year 1824, and incorporated by Special Act of Parliament in 1853, intends to ask leave to promote a Bill in the present session of Parliament, the main object of which is to facilitate the raising of new capital; and the opportunity will be taken to consolidate into one Act the several Acts under which the Association carries on its undertaking.

Among the latest dividend announcements for the past half-year are: Derby consolidated 10 p.ct. per annum (no change); Portsmouth consolidated 8⅛ p.ct. per annum, as against 7½ p.ct. per annum; Sheffield 6¾ p.ct. per annum, as compared with 6 p.ct. per annum for the corresponding half-year; and Uxbridge 7 p.ct. per annum as compared with 6⅝ p.ct.

The following transactions were recorded during the week: On Monday, Barnet 7 p.ct. maximum 115½, 116½, Bournemouth 5 p.ct. 13⅛, 13⅛, 13½, Cape Town 4½ p.ct. preference 62, Colombo 38s., Commercial 3 p.ct. debenture 59, Continental Union 115, 116, 7 p.ct. preference 119, European 16, 16⅛, 16⅜, 16⅝, Gas Light and Coke 19s. 7½d., 19s. 9d., 19s. 10½d., 20s., 20s. 1½d., 20s. 3d., 3½ p.ct. maximum 64¾, 65⅝, 4 p.ct. preference 80, 80½, 80¾, 5 p.ct. debenture 101¼, Imperial Continental 395, 397, 398, 400, 401, 402, 403, 405, 406, 407, 408, 409, 410, 411, 412, 413, 415, 416, 417, 418, Maidstone 3 p.ct. debenture 54, 55, Metropolitan (of Melbourne) 5½ p.ct. debentures 101½, Newcastle 3½ p.ct. 17s. 7½d., Primitiva 26s. 9d., 27s., 27s. 1¼d., 27s. 3d., 27s. 6d., 27s. 7½d., 27s. 9d., South Metropolitan 109, 3 p.ct. debenture 60½, Wandsworth, Wimbledon 5 p.ct., 120, Epsom 5 p.ct. 134. Supplementary prices, North Middlesex 5 p.ct. debenture 98, 98½.

On Tuesday, Alliance and Dublin 100½, 101, Bombay 21s., 22s., Bournemouth "B" 12⅝, Cambridge University 5 p.ct. debenture 94, Cape Town 4½ p.ct. preference 7, Continental Union 115, European 16½, 16⅜, 16½, Gas Light and Coke 19s. 7½d., 19s. 9d., 19s. 10½d., 20s., 3½ p.ct. maximum 65½, 4 p.ct. preference 80½, 3 p.ct. debenture 60, 5 p.ct. debenture 101¼, Imperial Continental 399, 400, 401, 402, 403, 404, 405, 406, 407, 407½, 408, 409, 410, Maidstone 5 p.ct. 127, 3 p.ct. debenture 54½, Primitiva 27s., 27s. 1¼d., 27s. 3d., 27s. 6d., 27s. 7½d., 27s. 9d., South Metropolitan 6½ p.ct. debenture 101½, Wandsworth "A" 146, "B" 129. Supplementary prices, East Surrey "B" 84½, 85, Harrogate 5 p.ct. debenture 99.

On Wednesday, Alliance and Dublin 101, British 117½, Commercial 100½, 101, Continental Union 117, 118, 7 p.ct. preference 120, European 16, 16⅛, 16¼, 16½, Gas Light and Coke 19s. 7½d., 19s. 8¼d., 19s. 9d., 19s. 10½d., 20s., 4 p.ct. preference 79¼, 79⅜, 3 p.ct. debenture 60, 60¼, 5 p.ct. debenture 101¼, Imperial Continental 396, 397, 398, 399, 400, 401, 401½, 402, 402⅛, 403, 404, 404½, 405, 405½, 406, 407, 408, Liverpool 7 p.ct. preference 102⅛, Primitiva 27s. 6d., 27s. 7½d., 27s. 9d., 27s. 10½d., South Metropolitan 108½, 108¾, 109, 109¼, 3 p.ct. debenture 60, Southampton 5 p.ct. 77½. Supplementary prices, Danish 8⅛, Peterborough 98, Worthing 4 p.ct. debenture 75.

On Thursday, Alliance and Dublin 101, Bombay 22s., Cape Town 4½ p.ct. preference £7 0s. 0d., Continental Union 118½, 119, 120, 121, 122, 123½, 124¼, 125, 126, European 16, 16⅜, Gas Light and Coke 19s. 7½d., 19s. 9d., 19s. 9½d., 19s. 10½d., 3½ p.ct. 65⅝, 4 p.ct. preference 80½, 3 p.ct. debenture 59¾, 5 p.ct. debenture 101¼, Imperial Continental 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, Primitiva 27s. 10½d., 28s., 28s. 1½d., 28s. 3d., 28s. 6d., South Metropolitan 109¾, 3 p.ct. debenture 61. Supplementary prices, Harrogate 5 p.ct. debenture 99, 99½, Leatherhead 5 p.ct. 10, North Middlesex 6 p.ct. preference 109½, 110, Swansea 5 p.ct. 79.

On Friday, Bournemouth 7 p.ct. 12⅝, 12⅞, Colombo 37s. 3d., Continental Union 122, 123, 123½, Croydon sliding scale 112, European 15½, 15⅞, 15⅞, 16⅛, 16¼, Gas Light and Coke 19s. 6d., 19s. 10½d., 3½ p.ct. 66½, 4 p.ct. preference 79½, 79⅜, 80¼, 5 p.ct. debenture 101¼, Hastings 3½ p.ct. 76½, Imperial Continental 387, 388, 390, 392, 392½, 393, 395, 396, 398, 399, 400, 400½, 401, 402, 403, 405, 406, 408, 410, 420, Primitiva 27s. 10½d., 28s. 1½d., 28s. 3d., 28s. 4½d., 28s. 6d., 28s. 9d., Wandsworth, Wimbledon stock, 118. Supplementary prices, Eastbourne "A" 124½.

On the Foreign Exchange market, Sterling on New York weakened to 4.85¾, and the movements of the principal Continental gold exchanges were unimportant. French francs closed at 124.27½; Italian lire at 92.78½; German reichsmarks at 20.45¾; Belgas at 34.93½; Dutch florins at 12.11⅝; and pesetas at 31.4.

Silver was unchanged at 25⅞d. per oz., while Gold remained at the usual price of 84s. 11½d. per oz.

The Bank rate is 5½ p.ct., to which it was raised from 4½ p.ct. on Feb. 7. The banks' deposit rate is 3½ p.ct., and the deposit rates of the discount houses are 3½ p.ct. at call and 3⅞ p.ct. at notice.

BRITISH INDUSTRIES FAIR, BIRMINGHAM SECTION.

[Feb. 18 to March 1.]

NATIONAL GAS DISPLAY IN THE HEAVY SECTION.

This week or next every gas engineer who can possibly do so will make his way to the eleven-acre display at Castle Bromwich (Birmingham) of the Heavy Section of the British Industries Fair. Organized and controlled by the Birmingham Chamber of Commerce (Inc.), under the ægis of the Board of Trade, this is by far the greatest display of British products ever undertaken by a voluntary public body. Among a total of nearly a thousand exhibitors, it is indeed a pleasure to find the gas industry again worthily represented. For this, generous tribute must be paid where it is due. To realize fully the magnitude of the efforts that have been made, those who inspect the completed Fair should have visited it during the stages of preparation. The Fair as a whole was a great success last year, when the gas industry took its rightful place in the front line; and we have no doubt whatever that this success will grow as the years roll by. In aiding this success, gas, as one of the great national industries, must continue to shoulder its responsibilities; and those who accept this duty will have a right to expect the sympathy and help of all connected with this vital public utility service. Repetition is necessary, if the utmost possible benefit is to be derived from publicity and display. The Gas Industries Section, the exhibits in which are detailed on later pages, is a striking example of grouping. It is, indeed, the only group in the Fair that is clearly defined by a universal colour scheme and type of stand.

As readers are aware, a three days' Gas Conference is taking place this week at the Fair; and at this papers are to be presented by Mr. R. J. Milbourne, Mr. Stephen Lacey, and Dr. C. M. Walter. Mr. Milbourne's contribution will be found in this issue; and a report of the remainder of the proceedings will appear next week.

Now, it is of course perfectly obvious that this distinctive scheme, which has resulted in the presentation of the gas industry as a united whole, has not come about by chance, but that, on the contrary, it is the result of exceedingly hard work. Thus before proceeding further, it is our wish to pay that tribute the need for which has been remarked upon in the introduction to this article.

NATIONAL COMMITTEE.

This Section is organized under the auspices of a National Committee fully representative of the various organizations in the industry. The members of this National Committee are as follows:

Representing the—	
SOCIETY OF BRITISH GAS INDUSTRIES	Mr. R. B. Hodgson Mr. C. S. Bennett Mr. Cyril G. Davis Mr. E. J. Davison Mr. D. M. Gibb Mr. A. W. Glover Mr. F. J. Gould Mr. R. J. Milbourne Dr. E. W. Smith Mr. Phillip Sugg Mr. H. M. Thornton Mr. Frank West
NATIONAL GAS COUNCIL	Mr. W. J. Sandeman Mr. L. E. Clift (Redditch)
INSTITUTION OF GAS ENGINEERS	Mr. John Terrace Mr. W. E. Price
BRITISH COMMERCIAL GAS ASSOCIATION	Mr. F. W. Goodenough Mr. Hubert Pooley
BIRMINGHAM CORPORATION GAS DEPARTMENT	Mr. A. W. Smith Mr. R. J. Rogers

Mr. R. B. HODGSON is Chairman of the National Committee.
Mr. A. W. SMITH is Vice-Chairman of the National Committee.
Mr. R. J. ROGERS is Honorary Secretary to the National Committee.

LOCAL ORGANIZING COMMITTEE.

A Local Organizing Committee to co-operate with exhibitors in the Section has also been formed, consisting of the following members:—

Mr. R. B. HODGSON	Whessoe Foundry and Engineering Company, Ltd., Darlington.
Mr. A. W. SMITH	General Manager and Secretary, Gas Department, Birmingham.
Mr. C. S. BENNETT	Gibbons Bros., Ltd., Dudley.
Mr. R. TALBOT CLAYTON	Cannon Iron Foundries, Ltd., Deepfields, near Bilston.
Mr. CYRIL G. DAVIS	Davis Gas Stove Company, Ltd., 60, Oxford Street, London, W. 1.
Mr. J. F. DAVIES	Radiation, Ltd., Essex Works, Aston, Birmingham.
Mr. D. M. GIBB	Parkinson Stove Company, Ltd., Stechford, Birmingham.
Mr. F. J. GOULD	Bland Light Syndicate, 25, Grosvenor Place, London, S.W. 1.
Mr. R. J. MILBOURNE	C. & W. Walker, Ltd., Donnington, near Wellington, Shropshire.
Mr. H. POOLEY	Engineer and Manager, Gas Department, Leicester.
Dr. E. W. SMITH	Woodall-Duckham Companies, Allington House, Victoria Street, London, S.W. 1.
Mr. R. C. RODGERS	President, Birmingham Chamber of Commerce.
Mr. G. N. GUEST	Chairman, Fair Management Committee.
Mr. G. H. WRIGHT	Secretary, Fair Management Committee.
Mr. C. STANLEY	General Manager, British Industries Fair.
Mr. C. ELLIOTT	Technical Assistant, British Industries Fair.
Mr. R. J. ROGERS	Chief Superintendent, Fittings Department, Gas Department, Birmingham, Hon. Secretary to the Gas Industries Section.

The general arrangements in connection with the Section have been under the control of Mr. Rogers, who has been ably assisted by Mr. R. G. Marsh, Fittings Engineer, and Mr. W. E. Cadwallader, Inspector in Charge of Exhibition Installations; and all working under them have responded wholeheartedly and with enthusiasm to the great demands that have been made upon their time and skill. Nothing, in fact, has been wanting on the part of anyone concerned to ensure the best possible results. The publicity arrangements are, of course, an important feature; and in these Mr. Rogers has been just as efficiently helped by Mr. W. L. S. Spinks. It was unfortunate that the closing stages of the preparations for the Fair should have coincided with a spell of arctic weather which in the ordinary course of things would have taxed to the utmost the resources of the Birmingham gasfitting staff.

As an instance of the material support which the Birmingham Corporation Gas Committee have given, it may be pointed out that they arranged for all gas supplied to exhibitors in the Gas Industries Section to be charged out at the lowest domestic rate, and for all gasfitting work to be done at cost price. The Gas Committee have always shown keen appreciation of the value of the Fair, and from the very commencement Mr. A. W. Smith (the General Manager and Secretary) has done an enormous amount of work in encouraging the formation of the Gas Section, and has taken every opportunity of stressing the importance of this national display by the industry.

USE OF GAS IN THE FAIR.

The close inter-relation between industry and the public utility supply undertakings is well illustrated by the wide use that is made of town gas at the Fair. This year the extensions of the Fair have necessitated the laying along the whole length of the buildings of a new 10-in. main, from which branches are taken off to each section. Over three-quarters of the total area of the buildings is lighted by overhead high-pressure gas lamps, giving a total illumination of 265,000 C.P. Great extensions have this year been made to the catering facilities; and gas is exclusively used in the eight great kitchens situated in various parts of the buildings. Over 200 cookers, roasters, boiling plates, vegetable boilers, and other types of canteen appliances have already been installed. In addition to the requirements of the Fair Authorities, the individual exhibitors are large gas consumers. Several of these

will consume as much as 2000 c.ft. of gas an hour; and 100 meters of different sizes have been fixed to register supplies to different stands. The gas consumption for the Fair, when on normal full load, will exceed 30,000 c.ft. an hour; and in fitting-up the various sections, over 5 miles of piping have been used. In the administrative and other offices in the Fair 50 gas fires have been fixed; and a further 50 will be in use in the various dining rooms and snack bars, together with a number of specially designed patent heaters.

Perhaps the best general idea of the extent of the gas consumed can be gained if one realizes that, when the Fair is open, as much gas will be used in the buildings as for the whole town of Banbury.

GAS INDUSTRIES SECTION.

As has already been remarked, the Gas Industries Section is an excellent example of the grouping system carried to its logical conclusion. Here we have some seventy firms embracing various activities of the gas industry—manufacture, distribution, and service—exhibiting in a compact group with a uniform basis to their stand design and a similar colour scheme throughout. The identity of the section is still better established by means of an Information Bureau in the centre of the group. It is interesting to note that the gas industry, which by the very nature of its business is more scattered than perhaps any other in our country—its manufacturing plant existing as separate units in every city and town—can so combine for a common purpose as to become an example to other industries, in which the setting-up of a definite group would not necessitate that perfection of organization which must have gone to the formation of the Gas Industries Section.

This organization speaks well for the vitality and desire for modernity which is present throughout the industry. That this modern spirit is really at work is well exemplified by the design of the Information Bureau erected in the centre of the Section. This is a good instance of how the modern tendency in design and decoration can be applied to a definite object. The Bureau fits its purpose; and its decoration is such that, while it pleases the eye, it is subordinate to the usefulness of the structure. The supporters of town gas need have no fear for their commodity while this spirit of youth remains with them.

The Gas Section makes a double appeal—first, to the engineer interested in the manufacture and distribution of gas; and, secondly, to the general public concerned mainly in the application of gas whether to industrial or domestic use.

EXTENT OF THE GAS INDUSTRY.

Attention is drawn to the importance of the British Gas Industry by means of banners bearing the following slogans. These are stretched at intervals across the building above the Gas Industries Section:

Over 100,000 men are employed in the gas industry.
£160,000,000 capital is invested in the gas industry.
The gas industry's wage roll is over £15,000,000.
The use of gas has doubled since 1900.
Gas is the fuel for homes of to-day.
Ninety p.ct. of the population cook by gas.
Gas is used in nearly nine million homes and factories in Great Britain.
Gas is used in over 3000 industrial processes.
Gas has a record of over 110 years' public service.
Ten million gas fires are giving clean, smokeless heat.
Gas will solve the nation's smoke problem.
If it's heat you want, it's gas you want.
Gas improves conditions for industrial workers.
Gas is the best fuel for producing high-quality goods.

DIRECTIONAL GAS LIGHTING FOR STREETS.

By ROBERT WATSON, Gas Engineer and Manager to the Doncaster Corporation.

Those interested in street lighting problems are conversant with the provisions of the Specification issued by the British Engineering Standards Association. They are therefore aware that the general classifications of street lighting installations are based on illumination with prescriptions of the minimum foot-candle values obtained on the horizontal plane at specified test-points lying approximately midway between the light sources in use.

These quantities were not intended to be regarded necessarily as criteria of the merits of any installation, but were adopted as affording the best and most convenient means available at present for indicating the comparative grade of illumination established in any stretch of street.

The classifications given in the Specification are as follows:

Class.	Rated Mean Test-Point Illumination.
A	2·0 foot-candles and upwards
B	1·0 foot-candle
C	0·5 " "
D	0·2 " "
E	0·1 " "
F	0·05 " "
G	0·02 " "
H	0·01 " "

Under "service" or working conditions, the illumination at any test point was not to fall below half the rated value given for any particular class; the allowance being made to cover unavoidable variations due to voltage or pressure changes, incorrect adjustments, soiled glass, and the like.

The test-point is a point on the ground within the area to be illuminated which is equidistant and as far as possible from the light sources which are subject to examination, and the "mean test-point" is the average of five or more such points along the street. It will be seen that the test-point does not necessarily lie on the diagonal line between two lamp columns.

Provision is made for securing suitable and graduated distribution of illumination along the road surface, so as to avoid abrupt changes at any point. The minimum height of light sources above the ground, and the spacing ratios for each class, are specified, to ensure the best possible distribution of the light available and to avoid as far as possible objectionable glare.

Reference to the fundamental provisions of the Specification has been made as a preliminary to some consideration of the position of gas street lighting under its operation. Gas lighting in the more important main streets and thoroughfares, with reasonably spaced lamps, can, and usually does, come within the compass of one or other of the classifications; and it is not proposed in such consideration to discuss the problems which may arise in connection with same.

Public gas lamps are used under varied conditions in all kinds of thoroughfares, and generally give satisfaction. In many cases, however, the lighting authorities, on the score of economy, or without special concern as to the need for improved illumination, are sparing in the number and size of lamps installed in the streets under their control. Small light units, not infrequently widely spaced, are thus the rule rather than the exception; and these are likely to be outside the scope of, and provide lower illumination than is covered by, the last Class H of the Specification.

This class calls for a rated minimum test-point illumination of 0·01 foot-candle, a suggested height of 13 ft. to the light source, and a spacing ratio of not more than 12 to 1—that is to say, 156 ft. between the columns. Class H is not recommended, but is to be regarded as the lowest which should be used, and then only in streets and roads where there is little through traffic. It was hoped that with the establishment of this grade of illumination as a minimum, lighting authorities might ultimately be led to consider the adoption of higher values as local amenities required.

It may be taken that in streets of this description gas light units consist usually of the smaller sized No. 1 or 2 burner clusters of the superheater type. It does not require much calculation to realize that with (say) twin burner clusters, mounting heights of 13 ft., and spacings of 156 ft., the midway rated value of 0·01 foot-candle cannot be attained, and that in the case of three cluster burners the illumination may be only just above that figure, though possibly satisfying the "service" conditions. The values from such units are the more difficult to achieve with inverted than they might have been with upright incandescent gas burners, since for street lighting purposes the polar distribution of light of the former, in spite of increased candle-power efficiency, is not altogether in their favour.

The all-round candle-power efficiency and lower maintenance costs of the modern superheater incandescent burner ensure the continuance of its use; and there is therefore some need of a method whereby directive distribution of illumination along the street surface can be obtained. The overhead reflector of an ordinary street lantern obviously aids the downward utilization of rays emitted; but this help is so far insufficient, as this light distribution is neither great nor localized.

It goes without saying that public lighting is regarded by gas engineers as of importance from the load factor point of view, and incidentally in keeping before the public the possibilities of gas for illumination purposes. With a type of light unit which can with confidence be recommended as having the advantages, candle-power for candle-power, of economy, softness of illumination, and diffusive effect, the problem of directive distribution invites solution.

It was consideration of these various points and the require-

ments of the British Standard Specification which led the writer to suggest to Mr. E. Stroud, the Chief Engineer of Holophane, Ltd., that he might turn attention to the adaptation to gas lamps of prismatic refracting glass, in which the firm specialized.

Mr. Stroud and his staff have spent some time in experimental work to this end, with the result that the Holophane Company have designed directional refracting plates made of heat resisting glass which, fitted into ordinary lanterns, appear to go a long way towards achieving what is required—directional gas lighting applicable to street illumination; and this without reducing at any point along the street surface the present available foot-candle values.

The use of prismatic refracting plates in street lanterns is calculated to help appreciably in increasing the effectiveness and distribution of the illumination afforded, and at the same time may bring within the scope of the British Standard Specification many gas street lighting installations which are at present outside it.

Due to the position of the burners relative to the plates, the device controls 180° of light rays emitted in the mid zone, and refracts the upper and otherwise lost rays in a lateral and downward direction, of 5° to 15° according to requirements, thus increasing the light intensity towards the midway point between the lamp columns. The plates must, of course, be fitted accurately in the positions prescribed or determined by the needs of any installation, as otherwise partial failure and disappointment may be experienced.

The Holophane two-way directional refracting plates are at present available for use only with the square type of street lantern, whether fitted with single or multiple burners. They are adaptable to existing lanterns, and involve no change of burner, and therefore no increase in gas consumption.

The writer has equipped a number of lamps with Holophane prismatic refracting plates, and proposes to submit for the consideration of others the results of the work. The name of the maker is necessarily and rightly given, but it may be advisable to add that he has no personal interest in the device or in the affairs of the firm; the only concern being the advancement of gas for street lighting purposes.

The use of refracting plates in Doncaster has been at present confined to Thorne Road, which is a main road leading out of the town, and to several side streets. The lamps on Thorne Road—over about half-a-mile—are equipped with triple No. 2 burner clusters, to which refractors have been added. The spacings are irregular, being governed by exigencies of side roads, and range from 50 to 70 yards. In two side streets, lamps having 18-in. lanterns and equipped respectively with triple and twin sets have also been fitted with refracting plates and subjected to tests In the case of the triple burner sets, with the burners in a row, the lamps are staggered, and are 155 ft. apart. In that of the twin burner lamps, also staggered, the spacing is 190 ft. All the light sources are 12 ft. high. The road in the first case measured 24 ft. 6 in. between the footpath kerbs. The refracting plates as mounted were 20° from the parallel position, and adjusted for maximum candle-power at 75° vertically.

It will be seen that the conditions as to mounting heights and spacing ratios are not in accordance with the provisions of Class H of the Specification; nevertheless the tests indicate the possibilities, without alteration of existing lamp positions, of increased illumination along the road surface.

The lamps with triple burner sets have been taken for tests along the diagonal line from column to column, along the central axis of the road, and at the Specification test-point. Tests were first made of the lamps fitted with refractors, and then repeated with the plates removed, so that comparisons were available under exactly the same conditions as to burners, pressures, and gas usage. The results are shown in the following table, which deals with the values half-way along the total span.

Horizontal Illumination in Foot-Candles from Both Lamps.

Distance from One Lamp to Midway Point.	Observer A. Diagonal Line. Refractors.		Observer B. Diagonal Line. Refractors.		Observer A. Central Axis of Road. Refractors.	
	Without.	With.	Without.	With.	Without.	With.
6 ft.	..	..	..	..	0·2	0·3
12 ,,	0·25	0·285	..	..	0·11	0·135
24 ,,	0·065	0·084	..	..	0·15	0·55
40 ,,	0·016	0·034	0·024	0·036	..	..
50 ,,	0·010	0·033	0·018	0·033	0·015	0·025
60 ,,	0·0082	0·034	0·013	0·028	..	..
77½ ,, midway	0·0068	0·022	0·009	0·0021	0·0068	0·022
Specification test-point	0·0025	0·0125	..	..	..	..

The tests of Observers A and B were made with different instruments and on different evenings, but both clearly show the effect of the plates. The important fact revealed is the considerable gain in the midway and Specification test-point illumination values, due to the use of the refracting plates.

The higher figures along the centre of the road and at the test-point, which is on the edge of the footpath opposite the midway point, prove that the increased illumination is general, and not merely along the diagonal line. In other words, the light controlled by the refracting plates is all light which would otherwise be wasted, and no light is redirected from any one

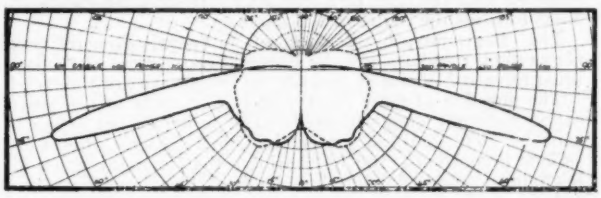


Fig. 1.—Vertical Candle-Power Distribution Curve.
With 4-light bijou superheated burner.

point of the street surface to another. So far as grade is concerned, the installation under test, if previously outside the Specification, is now safely in Class H.

Weather conditions did not allow of full testing in the second street, where lamps with twin burner sets and greater spac-

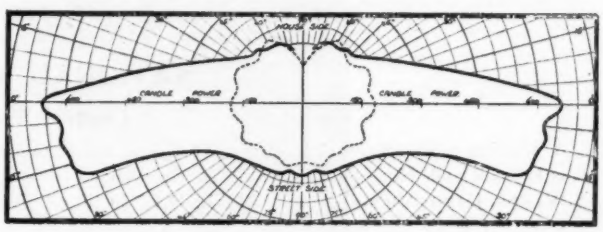


Fig. 2.—Plan Candle-Power Distribution Curve.
Through a 75° cone.

ings exist; but here again the "midspan" and test-point values show similar increases in illumination, and the 0·01 foot-candle (Class H) required at the Specification test-point was just reached, though with no margin. The increases in illumina-

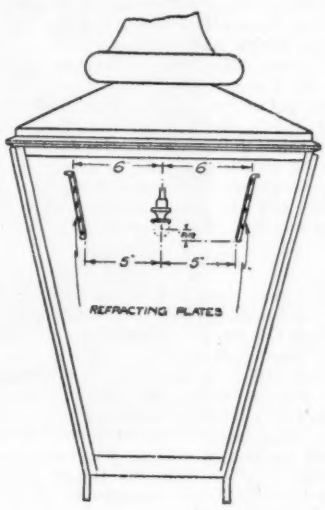


Fig. 3.—Elevation.

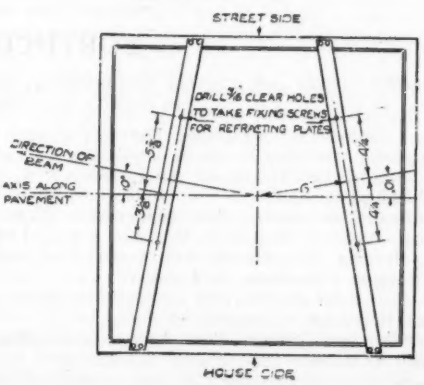


Fig. 4.—Plan.

tion values accord with what was indicated by the light distribution curves derived from a 4-light superheater burner set tested by the makers, and by their courtesy reproduced in fig. 1.

The broken line represents the polar distribution of light from the bare burners, and the full line that from the burners fitted with refractors.

Fig. 2 gives the plan candle-power distribution from the same set with the light flux directed for street illumination purposes towards the centre of the roadway.

The diagrammatic sketches of lanterns with refracting plates (figs. 3 and 4) show the general arrangement of the latter fitted for a 10° direction towards the central part of the street.

The question of glare dealt with in Clause 16 of the Specification naturally suggests itself. The writer is not altogether satisfied that glare in street light installations attains any serious proportions, and he considers that in many cases it is negligible compared with that obtained from motor-car headlights.

Directive lighting may, however, produce glare, and has to be watched. Fortunately street illumination in the case of gas lamps is obtained from several mantles, each having a relatively low intrinsic brilliancy and yielding diffused rather than concentrated light.

The Specification asks that lighting installations should be "as free as practicable from objectionable glare," and for the purpose of affording some indication of its possibility provides a theoretical method of appraising its extent. 'Bus drivers and motorists do not appear to be conscious of glare trouble from the refractors of the lamps fitted in Thorne Road. Glare can usually be found anywhere and from any light by those who are looking for it, and care was taken to make no direct reference to this aspect when ascertaining the ocular experiences of drivers of 'buses, of which there is a constant stream on the road in question. Slight glare is, however, possible at one point where lamps are low, but may not come into the category of "objectionable glare." It can generally be obviated by the simple expedient of increasing the height of the light unit. It may in any case be a negligible factor, since the increased illumination lessens the necessity of car headlight usage, and obviates the greater evil and serious trouble caused by the latter. One motorist remarked that he can now drive comfortably along the road in question without the use of headlights. There can be little doubt that "visibility" has been definitely improved; and this is corroborated by a statement of a 'bus driver that he can see the road surface from lamp to lamp where previously he was conscious of the intervening dark patches.

The opinions of pedestrians also have been distinctly favourable; and as a number of these were unsolicited, the fact of increased and better distribution of illumination is acknowledged.

It is interesting to add that the Watch Committee of the Doncaster Corporation have now, as a result of their observations of the Thorne Road lamps, recommended the Town Council to fit refracting plates to all gas lamps on the main roads leading out of the town.

NATIONAL GAS COUNCIL.

Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council took place on Feb. 12 at 28, Grosvenor Gardens, S.W.—Sir DAVID MILNE-WATSON, LL.D., D.L., in the Chair.

NATIONAL FUEL AND POWER COMMITTEE—SECOND REPORT.

It was stated that in July, 1926, the Council forwarded to the Board of Trade a Memorandum setting out in some detail the requirements of the gas industry with regard to the amendment of existing gas legislation. The President of the Board of Trade had referred this Memorandum, together with a Memorandum by the Board of Trade in reply thereto, to the National Fuel and Power Committee, who appointed a Sub-Committee to investigate the position. The Second Report of the National Fuel and Power Committee embodied the conclusions of the Sub-Committee, which had been approved and adopted by the main body. It was eminently satisfactory to observe that the proposals of the Council had, almost without exception, obtained the approval of the National Fuel and Power Committee, and it was stated in the Report that the Committee "have been impressed by the representations of the National Gas Council that the industry should be freed at the earliest possible moment from irksome restrictions, and we would urge accordingly that steps be taken without delay to promote legislation to give effect to the recommendations we make."

GAS LEGISLATION.

It was stated that the Government would shortly introduce in the House of Lords a short, non-contentious measure dealing with some of the requirements of the gas industry. Representations had been made by the Council to the Board of Trade and the Scottish Office, urging that a provision should be inserted in the Bill abolishing the anomaly at present existing under the Electric Lighting (Scotland) Act, 1890, whereby a municipal gas department was compelled to make good any losses incurred by the Municipal Electrical Department; but a reply had been received from the Board of Trade expressing their inability to embody an amendment of this nature in the Bill about to be introduced.

BILLS IN PARLIAMENT.

It was stated that the Council, following their usual practice, had carefully examined the Bills before Parliament, and had drawn the attention of the gas undertakings concerned to any clause likely to prejudice or interfere with their statutory rights.

SOUTHERN MOTOR ROAD BILL.

Members affected had also been advised to see that their interests were protected in connection with the proposed motor road from Croydon to Brighton, as the clause inserted in favour of public utility undertakings was not considered to afford sufficient protection. It was learnt, however, that morning that the Bill had been withdrawn.

LOCAL GOVERNMENT BILL.

It was reported that the Conjoint Conference of Public Utility Associations had considered this Bill, and that steps had been taken to endeavour to induce the Government to insert a clause in the Bill as follows:

> That public utility undertakings should retain the same rights to obtain compensation in certain cases against County Councils as they have to-day against Rural and Urban District Councils.

Following upon a deputation to the Ministry, it was hoped that an amendment on these lines would be accepted by the Government.

Endeavours were also made to induce the Government to insert the following amendment in the Bill, but the Government had intimated that they were not prepared to do so:

> That the rateable value of underground mains, pipes, &c., shall be taken to be one-quarter of the net annual value of the hereditaments.

COAL DELIVERIES.

A discussion took place with regard to the difficulties experienced by gas-works in obtaining supplies of South Yorkshire coal under contract, deliveries being seriously in arrears.

FORTHCOMING ENGAGEMENTS.

[Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.]

Feb. 22.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting in the Westminster Technical Institute. Paper by Mr. H. C. SIMS, Assoc.M.Inst.C.E., on "Works Inspection."

Feb. 23.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to Messrs. J. G. Stein & Co., Ltd.

Feb. 25.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of the Finance Committee, in London.

Feb. 27.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting.

Feb. 28.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the British Industries Fair, Castle Bromwich.

Feb. 28.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

March 1.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—Annual meeting.

March 5.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual meeting of the Lancashire Section of the Manchester District, in Manchester.

March 7.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual general meeting at the Grand Hotel, Birmingham, 2.30 p.m.

March 13.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Meeting at the Hotel Cecil. 2.15 p.m.

March 20.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting.

THE GAS INDUSTRIES SECTION.

EXHIBITS DESCRIBED IN ALPHABETICAL ORDER.

British Industries Fair, Birmingham.

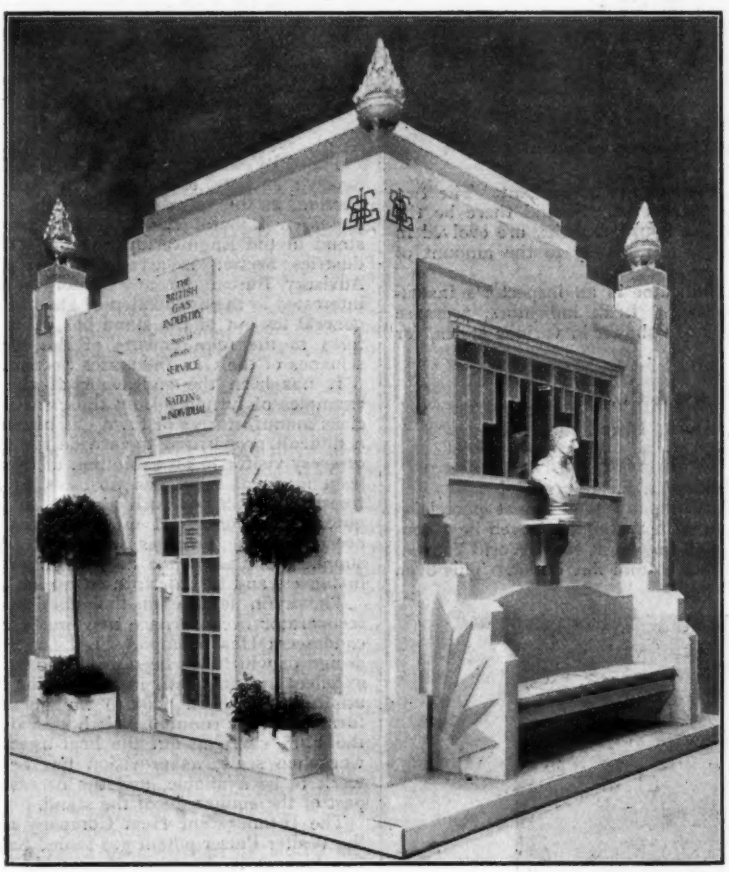
Central Information Bureau.

(Hon. Secretary's Office.)

The construction of the Central Information Bureau and the interior decoration have been carried out to the designs of Mr. J. F. Ritchie, the Publicity Manager to Messrs. W. & T. Avery, the scale manufacturers. It will be noted that the bust of Murdoch has been utilized in this modern scheme, thus associating the inventor of practical gas manufacture with the latest developments of the industry. Mr. Ritchie's business offices are situated in the original building in which Murdoch and Watt worked out their epoch-making inventions..

When entering the Bureau, the visitor is faced by an impressionist presentation of the various activities and functions of the gas industry. The hall is completely decorated with silver paper of a rippled canvas surface, on which the various motifs are painted. The wall facing the door presents clouds with rain falling from them. This is to show that the gas industry is endeavouring to fight for clean skies and clean air by means of gas jets, which are represented in the impressionist style on both side walls. On the wall directly opposite to the clouds are straight lines leading to a square top, symbolic of the powerful achievement and establishment of the gas industry in general. Similar motifs are introduced on the side walls, representing the Universe rising through the beneficial effects of gas.

The colours used throughout are jade green and cobalt blue.



THE CENTRAL INFORMATION BUREAU.

A "Haven of Rest" is provided under the shadow of William Murdoch.

J. C. Abbott & Co., Ltd.,

New Street, Birmingham.

[Stand No. 1; Block 12. D.]

Samples of Yorkshire and Derbyshire gas coal are exhibited by the above firm, together with the bye-products produced from these coals. An interesting analysis of the coal is also shown. Gas coke suitable for use in central heating apparatus is on view, while "Celtic" special foundry coke for employment in engineering castings is also included. Other classes of coke embrace Durham foundry coke for all general castings. Foundry pig iron and special cylinder iron for motor castings form interesting items of the exhibit.

Abbott, Birks, & Co.,

113, Newington Causeway, S.E.1.

[Stand No. 4; Block 12. A.]

A number of useful apliances for the distribution side of gas undertakings are displayed. First among them may be mentioned the "Abbirko" patent suction service cleanser, which withdraws the material forming the stoppage. The apparatus may be regarded as an emergency outfit for use before giving instructions for opening-up a road, although the ideal method, the firm maintain, is to clear all services by suction. There are force pumps of various patterns, among them an improved type, which is claimed to be both simple and strong, and to give the maximum clearing action on discharge. The "Abbirko" dies have been made to conform with the new British Engineering Standards Association Report, No. 21 (Taper Pipe Threads). They are guaranteed to screw threads of accurate formation, and are made to fit many of the standard American and English pattern stocks.

The bubble type pocket leak tester for testing fittings, meters, or any other closed pipe circuits or containers, is a development of the firm's well-known original leak tester. It is proving particularly useful for testing the soundness of new installations before connecting-up, as well as for testing the soundness of meters. A rubber bag acts as a flexible storage, and as a safety device against excessive pressure being forced

into the pipes. The slightest trace of a leak—as small as 1 c.ft. in 200 hours—is said to be instantaneously indicated by air bubbles passing through the water in a glass bell which has previously been partially filled with water. With the meter disconnected, and all open pipe ends closed, the leak tester is attached in an upright position to any convenient gas bracket in the installation. Pressure is then blown by mouth or pump through flexible tubing with taps on the tester and the gas bracket fully open. This fills the pipe circuit, and

Abbirko" Bubble Type Pocket Tester.

inflates the rubber bag attached to the instrument. The two taps on the tester are then turned off. Should there be the slightest leak in any part of the house, bubbles are evolved in the water in the bell glass proportionately to the amount of leakage.

" Shorts " standard leak indicator is an inspector's instrument for surface leak searching. Leak indicators, pressure gauges, and recording gauges are shown in various styles, for different methods of use.

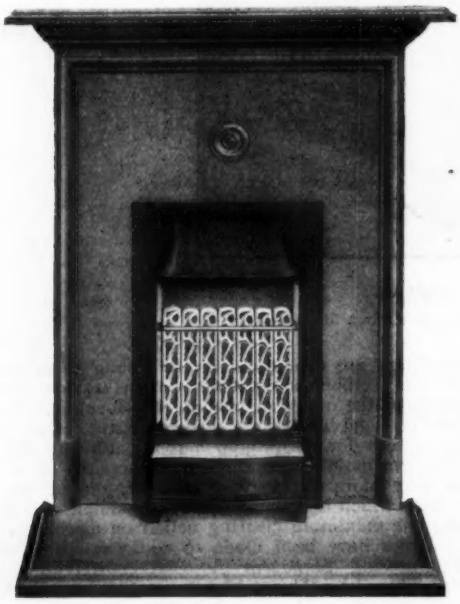
Arden Hill & Co.,

Acme Works, Aston, Birmingham.

(Radiation Limited, Proprietors.)

[Stand No. 1; Blocks 11. F. and 11. G.]

There are shown by this Company their latest porcelain-enamelled gas cooking range, with " Regulo " oven heat control, and incorporating the well-known " New World " oven, with its single burner and direct bottom flue outlet. This oven



The " Homeside " Mantel Register.

is also a feature of their No. RH44 " New World " cooker. A well-designed double griller, aptly named " Gorilla," is shown, complete with hot-closet on stand. A representative selection of the firm's beautifully designed gas fires—the " King," " Marchioness " (in wrought metal finish), " Sirius," &c., make a very fine display. Each has the patent " Injector-Ventilator " device in the canopy, and is fitted with the new " Beam " radiants.

The six-radiant " Homeside " mantel register, complete with hearth, will be of interest in connection with housing schemes, &c. The " Acmefont " boiler is well known to the industry,

Arden Hill's "Gorilla" Double Griller and Roaster.

and continues to increase its popularity. A 30-gallon size is to be seen on the stand, as also a " Hotwell " boiler (6-gallon) in " Rado " porcelain enamel finish. A " St. Bernard " radiator and a gas ironing set complete a very interesting exhibit from Acme Works.

City of Birmingham Gas Department.

[Stand No. 3; Block 12. H.]

The City of Birmingham Gas Department have a stand devoted entirely to the activities of the Industrial Heating Section, as the special work of other sections of the Industrial Research Laboratories has been provided for on a separate stand in the Engineering Section. The stand in the Gas Industries Section is arranged with a view to providing an Advisory Bureau for any visitor to the Section who may be interested in the application of gas to industrial processes. The general lay-out of the stand has, of course, been made to conform to the requirements of the special designs and colour schemes of the Gas Industries Section.

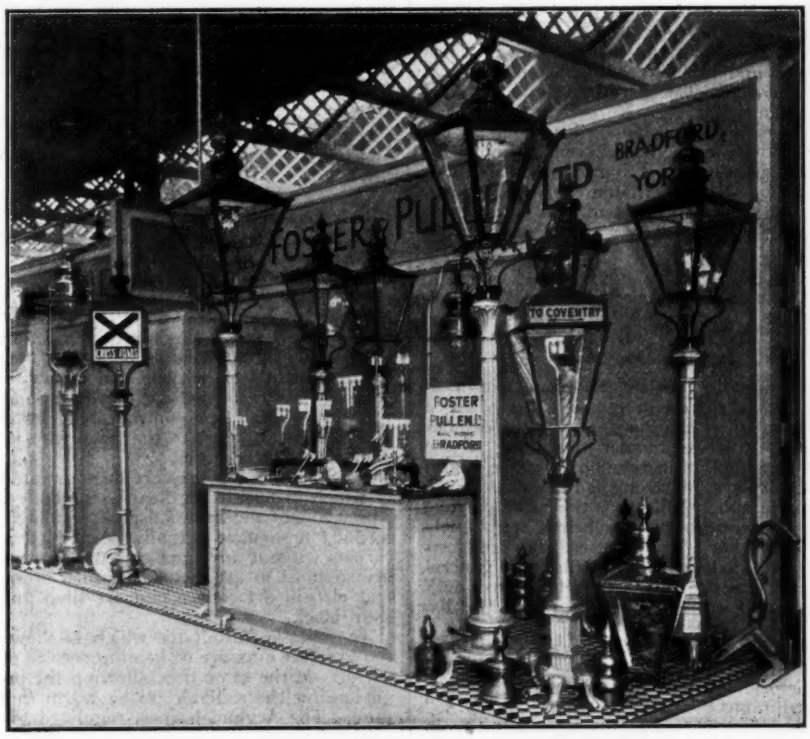
It has been the endeavour of the Department to provide examples of furnaces from those made by the recognized high-class manufacturers of town gas heated furnaces. It is always a difficult proposition to provide for the possible requirements of every visitor to an exhibition of this type; and a feature has been made of town gas furnaces as applied to general heat-treatment processes such as may be found (say) in a modern automobile works. It may be mentioned that in practically every case the furnaces shown have been arranged with gas supplies, and air when necessary, for continuous use in some instances, and for intermittent use on specific inquiry in others.

The main feature of the stand is probably the new type recuperator oven furnace now made as a standard by the Incandescent Heat Company, Ltd., of Smethwick—a furnace the design of which has been proved in several installations to give excellent results, both in carburizing and re-heating. Special attention has been paid to the question of insulation. This furnace will be running, it is hoped, during the whole period of the Fair, carrying out the heat-treatment of steel parts on a workshop scale, as provision has been made for supplies of work to be available, and the necessary quenching tanks are part of the equipment of the stand.

The Incandescent Heat Company also make, under licence, the Walter-Palser patent gas sealed furnace; and an example of this furnace is shown on the stand. It is available for special demonstrations under working conditions. The feature of this furnace is that work can be heat-treated with a minimum amount of oxidation and distortion, due to the fact that the heating operation and transference to the quenching medium are all carried out in a gaseous atmosphere. Several furnaces have been installed at various works, and in every case are giving complete satisfaction.

Continuing the description of furnaces for general heat-treatment operations, the Gas Department are showing a patent " Antiscale " oven furnace made by Messrs. Lucas Furnaces, Ltd., of Birmingham. This furnace is built with special metal recuperators, and provision is made for the waste gases to leave the working hearth at the front of the furnace at floor level, so that a complete screen of waste gases at the time of the door opening prevents the ingress of cold air, thus enabling the working hearth to be used to the fullest extent, and also preventing to a very considerable degree the oxidation of the work under treatment.

A special feature is also being made of furnaces suitable for the heating of salts, which in their turn are used as a medium for heat-treatment work. This method of heat-treatment has received considerable attention from engineers during recent years; and it may be said that town gas heating lends itself admirably to this particular application. In the present instance two furnaces have been provided—one for molten salts at the comparatively high temperature of 800° C., and the



A STREET LIGHTING EXHIBIT BY MESSRS. FOSTER AND PULLEN.

other for the lower temperature melting point salts generally used for tempering and suchlike operations. In each case these furnaces have been made and supplied by John F. Askam, of Birmingham.

No hardening shop equipment would be complete without furnaces suitable for the treatment of high-speed steels; and to meet this need two furnaces are provided. One of these is a small furnace of the well-known standard design of Brayshaw Furnaces and Tools, Ltd., which firm have been makers of this particular class of furnace for many years, and have a very large number of successful installations. Another high-speed steel furnace (made by Manchester Furnaces, Ltd., of Manchester) is shown, arranged with the usual pre-heating and high temperature chamber. A feature of this furnace is a tubular pre-heater built into the end part of the furnace brickwork for pre-heating the air supply. British Furnaces, Ltd., of Chesterfield, are represented by one of their standard type oven furnaces, arranged in this case for use with gas and air under pressure, with their well-known proportioning device. A furnace of this type is used for general heat-treatment operations, and can also be arranged for the attainment of very high temperatures for brickwork testing, &c.

By special arrangement with the Cambridge Instrument Company, a complete range of pyrometer apparatus is shown for the oven furnaces, salt bath furnaces, and also the high-speed steel furnaces. The equipment is complete with the necessary thermo-couples, indicators, and recorders, all of which are standard instruments selected from the stocks of the Company. A range of soldering iron stoves and air blast burners (A. H. Wilkes & Co., Ltd.) are also shown, as well as a number of smaller furnaces and burners by Brayshaw Furnaces & Tools, Ltd., of Manchester, J. F. Askam, of Birmingham, and J. Rowell & Sons, Ltd., of Newcastle.

Bland Light Syndicate, Ltd.,

25, Grosvenor Place, London, S.W. 1.

[Stand No. 1; Block 12. G.]

Among a large and varied selection of lighting fittings suitable for all positions in the home, factory, warehouse, shop, and office, may be mentioned the following:

Artistic Fittings for the Home, &c.—Brackets, pendants, shade lights, floor standards, with a unique selection of artistic vellum shades and bowls.

Domestic Silent Burner No. 1927.—The patentee has determined the relationship between a special venturi bunsen tube, a magnesia disc or wire gauze, and the ignition point, which secures a perfectly silent flame, and one that will not light-back.

Domestic Silent Burner No. 1928.—This is a new type giving nearly 40 candles per c.ft. of gas consumed. With three bijou mantles at an angle of 60°, it is stated to furnish a duty of 205·2 candles at a consumption of 5½ c.ft.

Maintenance Fittings.—Plain pendants and brackets, newly finished in "silver" steel bronzed (to match aluminium burners).

New Windproof Street Lamp.—A new outdoor lamp with a special baffle, which defies a wind at 60 miles per hour. In recent gales, we learn, these lamps did not even flicker. They are made in suspension and upright patterns.

There are also to be seen main cocks, unions, &c., gas mantles, daylight and gaslight dustproof tube signs, meters, gauges, service cleansers, and syphon pumps.

Geo. Bray & Co., Ltd.,

Leeds.

[Stand No. 2; Block 11. E.]

This firm again show an attractive and varied selection of their incandescent burners. Most of the patterns are now familiar to all gas engineers and managers—especially the No. 790, which is a standard burner for maintenance work. By its efficiency, durability, and moderate price, it has gained a great reputation, and the demand increases each year. A

Reversible Inverted Burner.

swan-neck burner (No. 820), made on the same principles as the No. 790, is also increasing in favour as it becomes more widely known. Both these patterns are fitted with heavy aluminium globe holders and deflectors, while the other metal parts are made from the solid bar or solid drawn tubing. The three-light medium cluster burner No. 843 is much used in shops, large rooms, and similar places, where a more powerful light is required than for ordinary domestic purposes. The

reversible inverted burner No. 61 is constructed with adjustable arm to accommodate old or new fittings, while another special feature is the spring-clip globe holder, which allows glassware to be removed and replaced without touching the globe-holder screws. There are also special patterns for bowl lighting, hall lamps, landings, &c.

Street lighting engineers will probably be interested in examining the selection of well-made incandescent burners for this purpose which are on view. In addition, there are a number of the well-known Bray flat-flame burners, which, although very little used for lighting purposes nowadays, should be worth the attention of manufacturers of gas heating apparatus.

British Commercial Gas Association.

28, Grosvenor Gardens, S.W.1.

[Stand No. 3; Block 12. L.]

This is approximately described as a "Sunshine City Display." The Association, as representing the industry as a whole, always endeavour, in exhibition features, to demonstrate in a striking and attractive manner something of the great part which the industry plays in relation to public health and hygiene. In past displays, a strong anti-smoke appeal formed the predominant feature. This year the more positive aspect is emphasized; a beautiful colour scheme, with finely illuminated and very telling background, attractively suggesting the ideal smokeless city, made possible by the more general application of the slogan "Use Gas and Let in the Sunshine." The dirt, smoke, and soot are entirely eliminated from the display.

Some of the great branches of public utility made possible by the scientific treatment of coal in the gas-works are indicated and illustrated in a pictorial as well as a practical manner. The whole display is strikingly effective; and the "B.C.G.A." are to be congratulated on another production which is certain to prove an attractive centre of great educational interest. The exhibit will make, as similar displays have already done, a strong appeal to municipal authorities, as well as to all interested in public health.

British, Foreign, & Colonial Automatic Light Controlling Company, Ltd.,

100, Holdenhurst Road, Bournemouth.

[Stand No. 2; Block 12. B.]

Here are shown all the firm's latest and most up-to-date gas controllers and electric switches. Controllers for every kind of lamp and requirement, both vertical and suspension controllers of both instantaneous and gradual lighting types. On the stand are seen some of the actual controllers used in 1898, which were the pioneers of automatic street lighting.

British Road Tar Association.

17, Grosvenor Gardens, S.W.1.

[Stand No. 1; Block 12. B.]

The British Road Tar Association are represented by displays both at the White City, London, and at Castle Bromwich. At Castle Bromwich the stand includes a display of samples of tar and aggregates used in the construction of roads. The scientific aspect has not been overlooked, and the various instruments employed in the testing of tar are on view. Novel features of the stand are seen in the "Big Ben" of the road world, which shows "round the clock" uses of tar; and the rotating tar barrel is again prominent. Literature on the tar treatment of roads is available; and representatives are in attendance to discuss any question with visitors concerning the use of tar for road-making.

To itemise the advantages of British tar for modern road surfaces is no easy task. Special mention, however, must be made of the non-skid surface of the tarred road—a feature, in these days of alarming skidding accidents, which is essential for public safety. In view of the huge expenditure on roads at the present time, any economical form of maintenance is of importance. A real saving can be effected by the conservation of existing roads. The use of British tar has lengthened the life of thousands of miles of roads in Great Britain. It is easily applied with non-skilled labour under skilled supervision.

Bromford Tube Company, Ltd.,

Rocky Lane, Aston, Birmingham.

[Stand No. 1; Block 12. K.]

This firm, who manufacture hot rolled weldless steel tubes of every description, have an interesting display of seamless steel lighting standards, and have recently introduced new types with fluted columns. These are very attractive in appearance, and while claimed to be superior to cast-iron in every way, are yet competitive in price. The firm are also showing seamless steel gas mains, coated and wrapped with impregnated hessian, and with the ends prepared for spigot and faucet and various types of joints.

Their exhibit includes boiler tubes, steam mains, superheater tubes and elements, coils and manipulated tubing, &c.

Cannon Iron Foundries, Ltd.,

Deepfields, Nr. Bilston, Staffs.

[Stand No. 2; Block 11. F.]

This firm are making a special display of the "Challenge," "Centenary," "Oxford," and "Cottage" gas cookers, in "Porceliron" mottle enamelled finish. This is the latest addition to the firm's series of "Porceliron" enamels; the mottle being distinctive, and affording a highly glazed surface. Of handsome appearance, the "Porceliron" mottle has become very popular, and cookers in this finish are held in high esteem by housewives desirous of obtaining the latest and best from the standpoints of hygiene and labour-saving. "Porceliron" enamels are renowned for durability and easy cleaning. The "Autimo" oven heat controller enables the cooking to be done without attention while the housewife is engaged upon shopping or domestic duties.

New inclined gas fires are demonstrated, the sloping radiants of which distribute the heat to the body as well as to the feet. The whole of the heat is usefully radiated into the room. New inclined fires have actually been fixed and used on valuable carpets without any trace of scorching taking place. The fires are supplied in art metal, sheathed brass, copper, and pewter, and also in art copper and art silvo finishes, as well as best satin black.

The "Belle" radiator which is shown is designed to give the greatest measure of heating service per square inch of tube surface, at the same time allowing the products of combustion, on leaving the radiator, to be warm (not hot) and chemically pure. The Argand burner, regulated by a pressure governor, ensures complete combustion. By means of the heat-resisting chimney a great amount of air is drawn past the flame. This heated air has to pass up the enamelled front tube, and down the rear tube before being discharged. The glow from the translucent chimney is enhanced by the copper reflector and adds to the cheery warmth of the radiator. The "Equator" gas-steam radiator, also shown, is well known for its efficiency and good service.

The "Corna" and "Modern" wash-boilers shown are all-cast and fitted with special acid-resisting enamelled inner pan. The angular top of the "Corna" pattern fits into any corner of the scullery. The outer pans can be supplied with "Porceliron" mottle enamelled exterior if desired.

The "K900" gas iron in "Porceliron" mottle enamelled finish maintains its clean and smart appearance after prolonged use; the enamel being unaffected by the heat. Grillers and hotplates are also exhibited.

Cellactite & British Uralite, Ltd.,

Higham, Kent.

[Stand No. 2; Block 12. C.]

The various specialities of the firm are shown—"Cellactite" steel-lined non-corrodible roofing, "Urastone" non-corrodible flue pipes and fittings, "Uralite" genuine fireproof sheeting, corrugated "Asbestone" (asbestos-cement), and "Asbestone" tiled fire surrounds. "Urastone" is incorrodible indoors and outdoors, the moist products being temporarily absorbed by the inside wall of the pipe, to be evaporated almost simultaneously by the warm up-draught. There is no "dripping-back" of condensation; the essential steady draught is maintained, and the pipe remains permanently clean, clear, and unaffected. In this way, "Urastone" pipes and fittings reduce the cost of maintenance. Since first placed on the market, "Urastone" has received a cordial reception in the gas and other industries. It is not an old class of asbestos pipe re-named, but is the outcome of many years' research and experience. "Urastone" is not exclusively a flue pipe for gas appliances, but can be used for venting other products of combustion or fumes where the temperature does not exceed 300° C. The larger diameters can be employed for ordinary chimneys and stacks, and can be bricked-in with safety, chimney breasts (in the case of gas fires) being unnecessary, and great economy in brick-work being thereby effected.

A special feature is made of "Asbestone" fire surrounds and hearths, which afford a superior tiled appearance at a fraction of the cost of tiles. In this way, "Asbestone" meets a real need. It provides at a trifling cost all that is necessary to present a gas fire in an attractive form. "Cellactite" (for roofing) is an imperishable compound of high-grade asbestos and asphalt, consolidated by pressure, with a steel core, and supplied in the form of standard corrugated sheets up to 9 ft. in length. It requires no painting or other protection, and is permanent. The steel core is thoroughly cleansed, perforated, and the burrs left. These burrs help to key the steel to the "Cellactite" covering subsequently applied. The sheets are then immersed in a bath of protective and chemically inert bitumen. This bitumen has a high melting point, and is

A METER TESTING INSTALLATION.

unaffected by any temperatures met by sheets in use. The bitumen coating is tough and rubber-like, and completely resistant to weather, acids, &c. Further, it is tenaciously adhesive, and permanently binds the later coverings to the steel base. The coverings, consisting of an upper and an under sheet of asbestos-asphalt felt, undergo special heat treatment, and are then applied under a pressure of 2000 tons. At the same time the edges are sealed. The result is a sheet which is strong, light, and completely resistant to weather and corrosion.

Clarkhills, Ltd.,

5, Cornwall Street, Birmingham.

[Stand No. 3; Block 12. A.]

The Clarkhill automatic water heater is shown in actual operation, supplying bath, lavatory basin, sink, &c., and is available for demonstration purposes. In addition, the Clarkhill storage heater is shown, the cylinder having a capacity of 9 gallons, and the temperature of the water delivered being about 200°, with the very small consumption of two small jets —No. 1 Bray geyser jets. There is also on view a Clarkhill one-point geyser, this being mounted at the end of the bath, and in actual operation.

Samuel Cutler & Sons, Ltd.,

39, Victoria Street, London, S.W. 1.

[Stand No. 2; Block 12. L.]

Gasholders obviously cannot be exhibited in kind, and Messrs. Cutler, who are one of the oldest specialist firms manufacturing these structures, have necessarily restricted their exhibit to a range of photographs illustrating a selection of their productions. These are arranged in a series of panels, and constitute an interesting record of many notable holders both at home and abroad. Every type of holder is represented, and Messrs. Cutler must be congratulated upon the enterprise and organization which enable them to instance such fine examples of British engineering at Rome, Turin, Vienna, &c., equally with those at home. Selections are also shown of purifier installations, condensers of various types, elevating and conveying plant, carburetted water gas plant, oil and water tanks, &c., and hydrogen production plant for airship inflation. Although the pride of place is given to gas plant, the photographs of grain silos, refrigerating plants, steel buildings, &c., show that the firm's successful activities also include a wide range of general engineering.

Davis Gas Stove Company, Ltd.,

Diamond Foundry, Luton.

(Radiation Limited, Proprietors.)

[Stand No. 1; Blocks 11. F. and 11. G.]

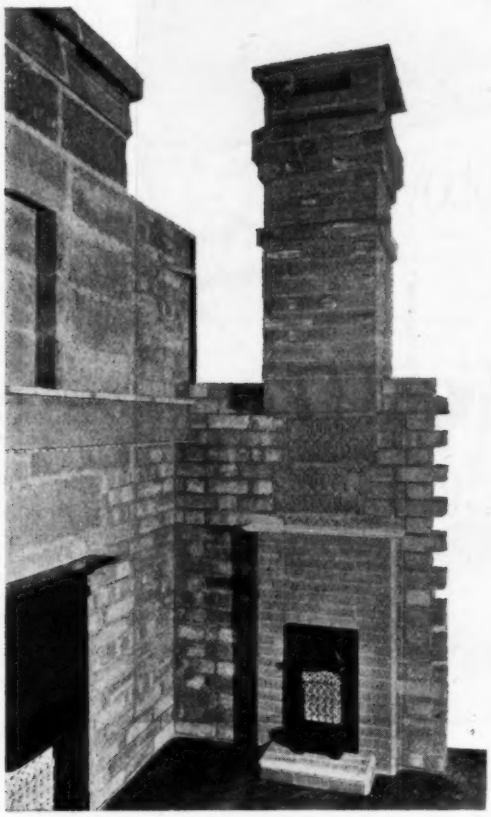
The Company are again well represented with a fine example of individual effort in their "Hot Top" cooking range—a porcelain-enamelled production with every conceivable improvement both in labour saving and efficiency. As its name indicates, the top of the oven is independently heated, and is a valuable addition to the many features of this range.

The Davis "Balance" Gas-Heated Radiator.

Some very interesting designs of gas fires are shown, including the well-known "Antony," "Standen," and "Cleopatra," the last-named having the beautiful armoured finish that has so greatly increased the popularity of Davis gas fires. A seven-radiant gas mantel register is to be noted for its unique appeal to architects and housing scheme directors.

The Company's long experience in geyser construction gives

special significance to their exhibit of this class of appliance—the " New Shamrock " geyser being a fine example shown. A clean looking and workman-like pastry oven, and a " Perfectea " boiler on stand, are of interest to the catering trade;



"The Nautilus" Flue Block System.

and there is a boarding house type of gas cooker, finished in porcelain enamel, and with the additional advantage of the " New World " oven, with its " Regulo " automatic heat control. A " Nautilus " coke boiler demonstrates another of the activities of the Davis organization.

W. H. Dean & Son, Ltd.,

Victoria Works, Burnley.

[Stand No. 3; Block 11. D.]

This firm are exhibiting a variety of their manufactures. Among boilers on view are those having the outer casing made of strong steel sheet and porcelain enamelled black-and-white mottled finish. This type of boiler is durable, and can easily be cleaned. Some of the boilers are fitted with brass draw-off tap for emptying. This attachment can be supplied on any type of boiler if required. Copper water heaters and counter urns for restaurants are included, together with samples of stove piping, corrugated elbows, bafflers, &c.

Bryan Donkin Company, Ltd.,

Chesterfield.

[Stand No. 5; Block 11. L.]

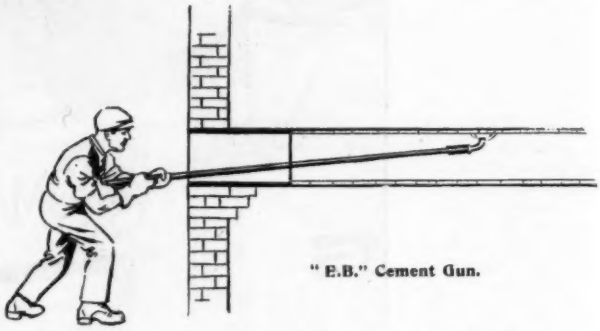
The firm have a stand on which are a number of large framed photographs of their machinery; among them being one of a high-speed duplex vertical steam driven reciprocating compressor, with totally enclosed frame, and fitted with forced lubrication to all bearings. It has automatic control operated by gas pressure, and easy accessibility to working parts. There is also a photograph of a large vertical gas compressor of similar construction, which is driven by a gas engine. Besides the photographs, the firm display a few models of their various types of valves and gas exhausters.

The E.B. Refractory Cement Company, Ltd.,

147, Corporation Street, Birmingham.

[Stand No. 2; Block 11. D.]

This exhibit consists of refractory cements and tamping mixtures, specially blended to meet the conditions obtaining in the gas industry. The novel feature is the " E.B." cement gun and gun cement mixtures, by the aid of which leaks are stopped, and eroded surfaces built up, in retorts, either vertical or



"E.B." Cement Gun.

horizontal, at working heats Demonstrations of this are given.

Evesons (Coal), Ltd.,

134, Edmund Street, Birmingham.

[Stand No. 5; Block 12. B.]

This exhibit, by one of the largest firms in the Provinces, with many branches in other towns, including London, Barnsley, Belfast, &c., comprises different kinds of coal for various purposes, together with a range of bye-products; and in addition, an actual 12-ton railway wagon is shown, as built by the exhibitors at their Albion Wagon Works, West Bromwich. The wagon is a fine specimen of its kind, and strikes the ordinary public as being of huge dimensions. It will doubtless interest many visitors. The stand is really unique in its way, the wagon being arranged with steps leading into it, to permit of close inspection of the various kinds of coal shown therein.

Ewart & Son, Ltd.,

346-350, Euston Road, N.W.1.

[Stand No. 1; Block 12. H.]

A special feature of this stand, which includes all the firm's best-known water heating appliances, is found in the coloured " Agate " porcelain enamelled baths and lavatory basins, which are made in many handsome styles. These are manufactured by the Associated Company, Messrs. Saunders & Connor, Ltd., of Barrhead.

In the matter of geysers, there is a range from the small " Brilliant," capable of supplying a lavatory basin, to the " Supreme " and " Califont," for a supply of hot water to any tap in a house, upstairs or downstairs. The " Supreme " is an automatic labour-saving type of apparatus,

"Bollo" Gas Heated Copper.

which meets every need, in that, after once lighting the pilot, hot water is instantly obtainable at bath, basin, and sink at any hour of the night or day. For supplying hot water for a bath only, the " Victor " geyser is recommended by the firm; the price being moderate, and within the reach of most people. Large numbers of this type of heater have been adopted with complete success for housing schemes throughout the country. The " Lightning " geyser is a standard model for all-round domestic requirements, not only for the bath, but for supplying actually boiling water for drinking and culinary purposes.

There is no contact between the heated water and the products of combustion; the water chambers being coated with pure tin and sealed. "Agate" porcelain enamelled taps require no cleaning. The working part of the valve is of brass, but covered with a metal casing, which is porcelain enamelled.

Ewart's "Boilo" gas heated copper has important features of a novel and exclusive character. The outer casing is of stout galvanized sheet iron. The flue construction is arranged to take away the fumes from the gas and the steam from the boiling water; and the socket is fitted for easy connection to the ventilating pipe. The atmospheric gas burner is fitted with a special adjustable regulator controlling the air to suit the gas pressure.

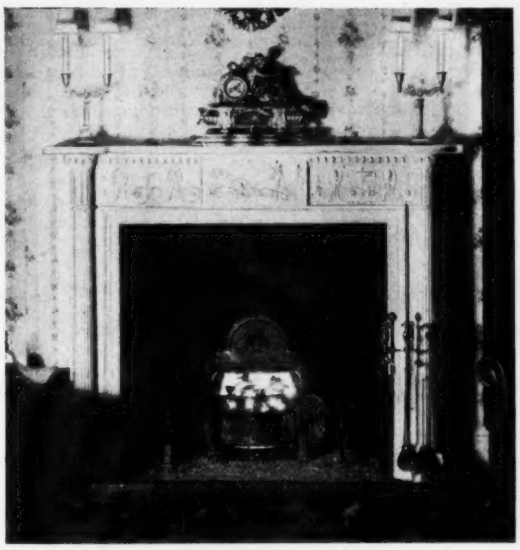
Sidney Flavel & Co., Ltd.,

Leamington.

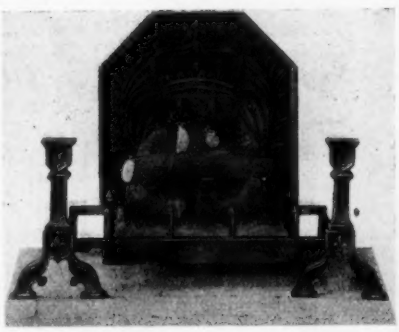
[Stand No. 1; Block 12. E.]

A display is made by this firm of modern gas fires, cookers, radiators, coke fires, and log fires. Cookers are to be seen in French grey and mottled porcelain enamel. The oven linings of the "Flavel" gas cooker are detachable trays in which solid sheets of Bell's cellular asbestos are inserted, and they are easily removed. The only fastening is a brass nut with milled head and clip. The hotplate construction is interesting. A loose welded steel frame which carries the burner and griller rests upon four supports. All burners and grillers are loose, and are merely lifted out. The front part of the plate is a polished casting, and forms the gas supply and serves to protect the taps from grease. A feature is made of the "Metro" coke grate. This grate is specially designed and constructed to burn gas-works coke. Coke burned in a "Metro" grate makes a brightly glowing fire, capped with flickering flames, which has all the psychological appeal of a coal fire. Owing to the special construction of the grate, and to the fact that coke does not cake when burning, the fire requires little attention beyond the occasional addition of fuel. The coke is ignited by a gas burner—a special feature of the "Metro" coke grate—and thus all the labour and inconvenience associated with the use of paper and wood are obviated. The burner need not be in operation longer than from 15 to 20 minutes.

A point is also made of the "Metro-Log" gas fire, which gives all the pleasing effects of a real log fire, without any of its disadvantages. A "Metro-Log" fire does not require to be replenished with logs, nor does it produce ashes to be cleared away. Consequently its hearth is always clean and tidy. The "Metro-Log" fire lights up quickly, and in a little while radiates a pleasant, glowing, heartening warmth. It is made



A "Metro" Coke Grate at Work.



Flavel's No. 3 Log Basket Grate.

AN ELOQUENT LIGHTING DISPLAY.

in two sizes; the smaller fire consuming a quarter of a therm, and the larger half a therm, per hour.

Flavel's "Leamington" gas fires are made in many different styles, to suit requirements. Radiants of standard size are employed and the projecting toes on the Flavel self-centering burner ensure the radiants being accurately centered over the burner nipples—resulting in perfect flames.

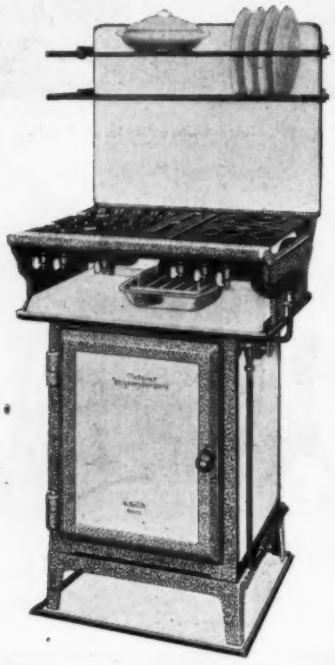
Fletcher, Russell, & Co., Ltd.,

Palatine Works, Warrington.

(Radiation Limited, Proprietors.)

[Stand No. 1; Blocks 11. F. and 11. G.]

This firm show their "Queensway" gas cooking range, and the "Kingsway New World" in "Rado" porcelain enamel finish—each having the "New World" oven principle of design. A wide range of other Fletcher appliances includes gas



The Fletcher "Kingsway New World" Cooker.

fires, water heaters (with the "W.H." heater with towel-rail, cast brackets, and shelf, and the "Celerity," a nickel-plated, highly efficient appliance of unusual merit), and the "Carisbrooke" gas fire, as an example of Fletcher's mahogany finish. This reproduces the actual appearance of the wood itself in a very pleasing way.

Large hotel apparatus has always been a prominent part of the firm's business, and outstanding examples of this type of appliance are shown. "Embassy" radiators will be admired, as showing one of the latest methods of flexible gas

The "Laurel" Gas Iron.

heating systems of entire dependability. One of the most popular of the smaller exhibits is the Fletcher "Laurel" gas iron, which is efficient, handy and easily cleaned, being covered in "Rado" porcelain enamel.

Foster & Pullen, Ltd.,

Avil Works, Crossley Hall, Bradford.

[Stand No. 4; Block 11. D.]

The stand of this firm is devoted principally to a display of lanterns, burners, pillars, and accessories for street lighting. Street lanterns are shown of various sizes and patterns, square, hexagonal, and circular. There are also to be seen inverted lamps, both suspension and "U" bracket type. There are noticeable "glittering" signs, visible day or night, and suitable for use in conjunction with their street lanterns.

A feature of the exhibit is a square lantern similar in general construction to the ordinary type, bearing lettered tablet with street names. This device is the invention of Mr. John Bond, of Southport. The height of the lantern is increased somewhat, however, to permit nameplates or the like signs to be mounted where they will not intercept light from the burner required to illuminate the roadway. By means of an inclined mirror or mirrors, provided with adjusting screw to obtain the correct focus, any light rays which would otherwise be lost in the upper part of the lanterns are directed to the nameplate.

Lantern with Lettered Tablet.

The illustration shows the mirror reflector made in sections for convenience of renewal or for forming into any required shape. The general effect of the device (which has been provisionally protected) is to intensify the illumination of the nameplate, making it visible at a greater distance, without absorbing any of the light which would ordinarily be available.

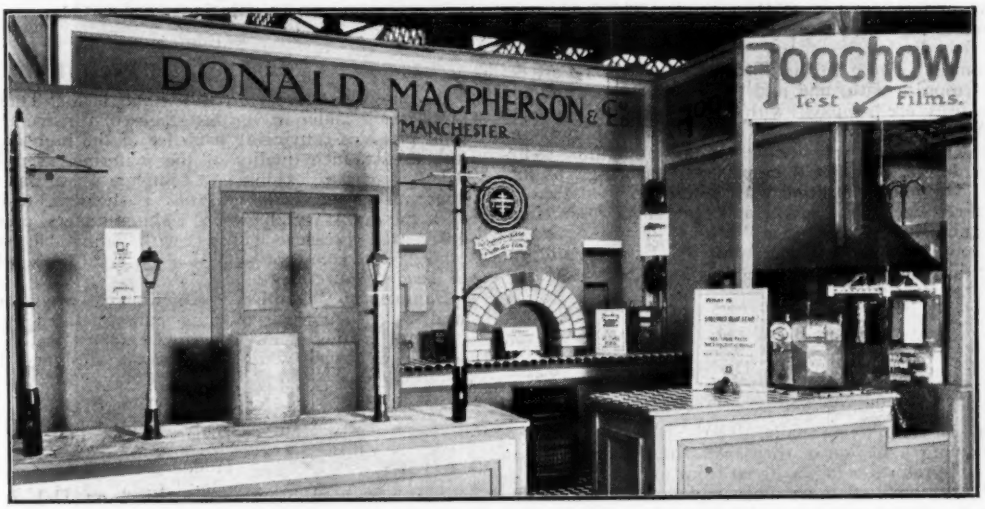
Foster Instrument Company,

Letchworth, Herts.

[Stand No. 1; Block 11. L.]

The main interest to gas engineers in this exhibit is with relation to the measurement and control of temperature and the measurement of heat. One new instrument is of special interest—the surface heat loss gauge, the invention of Captain A. Blackie. When the sensitive surface of this gauge is applied to any hot area—for instance, the outer wall of a retort setting—the rate of heat loss in British thermal units, per square foot per hour, is derived directly from the "graph" supplied with the instrument. Thus the problem of investigating, and reducing, heat losses from furnace walls is at once

Surface Heat Loss Meter.

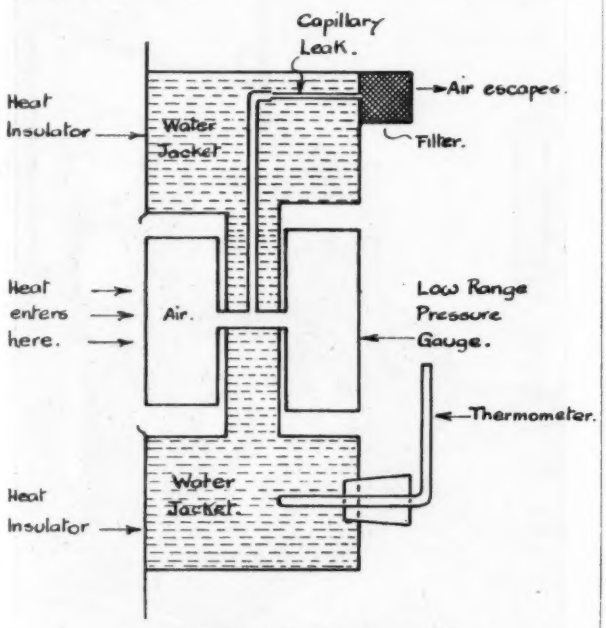


PAINTS AND PROTECTIVE COATINGS.

lifted out of the morass of vague assumptions or laborious and not always accurate measurements and calculations.

The instrument comprises a closed capsule containing air. This capsule is connected to a sensitive pressure gauge and to a capillary leak. When the surface of the capsule receives heat, the air therein expands, and the pressure continues to increase until the rate of leak through the capillary orifice exactly balances the rate of expansion due to the heat received, when a steady reading is shown on the pressure gauge, lasting for several seconds.

The instrument is provided with a water jacket to maintain the general air temperature at a steady figure, and also with a thermometer by means of which the user can see when change of the jacket water is needed. In practice, a considerable



Constructional Details of Heat Loss Meter.

series of readings can be taken before change of water is required. A "graph," connecting pressure as shown on the gauge and rate of heat loss, is supplied with the instrument, which is packed in a copper box with a carrying handle. An ingenious use is made of this copper box. When the carrying chocks are removed therefrom, it may be filled with water and then brought to a steady temperature—for instance, boiling point. The presentation of the gauge to the surface of the box then enables a check to be made, so that the user can at any time assure himself that the instrument is in correct calibration.

"Gas Journal,"

11, Bolt Court, Fleet Street, London, E.C. 4.

[Stand No. 1; Block 12. L.]

Walter King, Ltd., proprietors and publishers of the "GAS JOURNAL," again occupy space in the Gas Section of the Fair. On their stand are exhibited the gas industry's leading publications—the "GAS JOURNAL" and "GAS SALESMAN." The "GAS JOURNAL," first published in 1849, has given eighty years' continuous service to the gas industry; while the "GAS SALESMAN," more recently introduced, is the only publication devoted exclusively to the all-important and rapidly-extending work of customer service. On the stand the current numbers of these papers are available for reference; and various styles of binding quarterly volumes are shown. In addition, the year-books and other publications are exhibited; and visitors to the Gas Section are invited to treat the stand as a "Service Bureau."

INDEPENDENT PANEL HEATER.

On the stand of the "GAS JOURNAL," and on the wall at the back of the platform in the Conference Hall, may be seen a new type of gas heater in the form of a self-contained panel radiator which is shown for the first time.

This radiator, which is 3 ft. long by 18 in. wide and is constructed of copper, is fixed to the wall with the centre about 4 ft. from floor level. It is only 3½ in. in depth, and as it takes up no floor space, is particularly suitable for fixing in entrance halls, lobbies, offices, garages, &c., and in positions where a small amount of low-temperature radiation is required.

The consumption of gas in this particular radiator is only 6 c.ft. per hour. It may be constructed in a variety of sizes and designs, and ornamented or finished to suit any desired style of furnishing. The consumption of gas in the larger heaters would, of course, be proportionately greater than the one now exhibited. The back of the heater is lined with non-conducting material, and the heater is readily fixed to any wall by two lugs.

One of the chief advantages claimed for this apparatus mounted above the floor and giving out radiant heat at a comparatively low temperature, is that a feeling of warmth is imparted to persons in the vicinity without the necessity for raising the surrounding atmosphere to any given temperature, so that the apparatus is extremely effective for the amount of gas consumed.

This new panel radiator which [we are informed] has been provisionally patented is shortly to be placed on the market at a price which it is expected will command a ready sale. There is no doubt that it will prove a further useful contribution to the many forms of heaters constructed for the use of town gas.

General Gas Appliances, Limited,

Guide Bridge, Manchester.

[Stand No. 2; Block 12. F.]

There are introduced here the complete series of "Governor-General" gas cookers, with enamelled and cast exteriors, in mottled or white leadless porcelain enamel—high-grade and ordinary finishes. They are all designed to better the cooker introduced last season, but retain, without alteration, the development of the single burner oven which introduces the new principle in the method of heat circulation. This is obtained be means of a patented front flue device (removable for cleaning) in the door, which is connected to the dome, and finally to the flue outlet at the top of the oven. Another addition is the "Governor-General" level top gas range, which is shown for the first time.. This range is of a superior type, and is designed and built for lasting service. It can be supplied in the high-grade or enamelled finishes. The "Governor-General" cookers are fitted with an approved (1929) "economic" auto-

heat regulator with white enamelled cone dial. This is accurate in action, and is regulated directly from the front.

An attractive display is of the "General" "high-peak" series of gas fires. These are dignified and original, and are designed to harmonize with, and add to the appearance of, any room. The fires are supplied with the "General" gas-fire radiants. Another introduction is the "General" gas-fired "non-steam" radiator—a distinctive type of single-tube radiator of plain design, without dust pockets, ensuring absolute cleanliness. The burner is fitted with auto-heat regulator. It is made in three sizes—five, seven, and nine loops, 38-in. high over all. Again, there is the "ace" of gas irons, designed on an entirely new principle. This maintains a steady uniform heat, evenly distributed. It is finished in leadless enamel.

Gibbons Bros., Ltd.,

Dibdale Works, Dudley.

[Stand No. 1; Block 11. J.]

This firm, in conjunction with Messrs. Gibbons (Dudley), Ltd., are showing a section of their latest horizontal silica retort setting; the retorts being built up from 95 p.ct. silica segments, and the combustion chamber and cross walls of the same material. The construction of the setting can be studied very easily, as the walls are broken away for this purpose. Another item of considerable interest to gas engineers and coke oven managers is a section of Gibbons "Kogag" coke oven walls and heating flues, built full size from patented silica interlocking blocks. A study of this construction will show that it is practically impossible for any leakage to occur or for the walls to bulge inward owing to the clever design which, of course, can be applied to vertical and horizontal ovens with equal facility. A small sectional model of Gibbons "Kogag" ovens can also be inspected.

In industrial heating, Messrs. Gibbons show a new patented floor construction for close muffles for annealing, enamelling, and other heat-treatment purposes. This floor is formed of deep corrugated sections made from carborundum or a special fireclay to suit various metallurgical requirements. Owing to its special section, the tiles are extremely strong and can therefore be kept comparatively thin. This, of course, permits of rapid heat transmission. The advantages of this floor are that it doubles the heat radiating area as compared with the ordinary flat construction, and thus reduces fuel consumption and increases output.

Drawings and photographs of plant installed by this firm are also on view, and form an interesting exhibition for gas engineers and users of furnace plant.

Gibbons (Dudley), Ltd.,

Dudley.

[Stand No. 1; Block 11. J.]

Gibbons (Dudley), Ltd., exhibit a very wide selection of best quality refractories. The firm have always adopted a progressive policy with regard to the manufacture of refractories, and are able to meet modern conditions in all industries. This especially applies to coal carbonizing, and we find exhibited retorts, shapes, and segments in fireclay, siliceous, and silica material suitable for use in horizontal and vertical gas installations and in coke oven plants.

For the metallurgical and allied industries, a full range of refractories is shown—panels, bricks, shapes, &c., in best firebrick material, carborundum, corundum, and sillimanite. The advantages of carborundum and corundum are their great strength, high refractoriness, stability, and high conductivities (carborundum is 7 times, and corundum 5 times, as conductive as firebrick).

Messrs. Gibbons (Dudley), Ltd., also specialize in aluminous refractories, and show bricks of this class in various compositions and textures for lime kilns, rotary cement kilns, stoker arches of water-tube boilers, pulverized fuel furnaces, oil fired furnaces, and zinc oxide furnaces. Special jointing cements for each class of refractory are shown, and a super jointing cement compounded from zirconium oxide is exhibited.

George Glover & Co., Ltd.,

Ranelagh Works, Royal Avenue, Chelsea, S.W.3.

[Stand No. 4; Block 12. C.]

The exhibits of this firm consist of their latest ordinary and prepayment standard and high-capacity meters; some of them being fitted with glass cases, to demonstrate their working. Gas fire meters for use in boarding houses and hotels are shown working in conjunction with gas fires. There is also a show-case displaying the numerous individual parts which require to be assembled to produce a single standard meter, together with a 150-lt. meter fitted with a low reading index, showing that the firm's large meters will register accurately the consumption of a single burner.

Thomas Glover & Co., Ltd.,

Edmonton.

[Stand No. 1; Block 11. E.]

An interesting item on this stand is a "Thomas Glover" prepayment meter in various stages of construction. This exhibit provides convincing evidence of the high degree of finish and the staunch quality of the materials used in each part. Another striking exhibit is a complete set of gas meter testing apparatus, comprising two test gasholders, test table, fitted with the necessary pipework, leakage meters, pressure gauges, differential pressure gauges with adjustable scales, rubber tubing, cone connections, &c., all in accordance with the Board of Trade requirements.

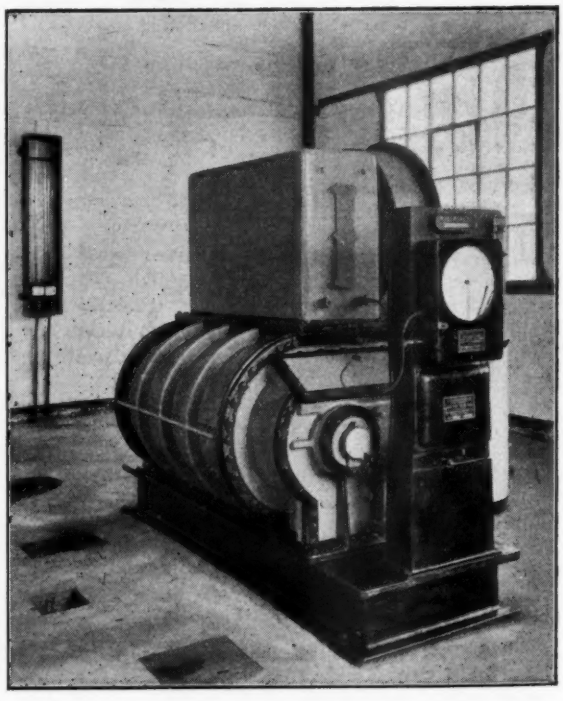
Samples of "Gothic" street lanterns are also on view, as well as "Puck" gas flashing signs operated by gas pressure only. A further item of technical appeal is the firm's patent service cleanser, which is specially designed for removing naphthalene.

W. C. Holmes & Co., Ltd.,

Huddersfield.

[Stand No. 2; Block 12. D.]

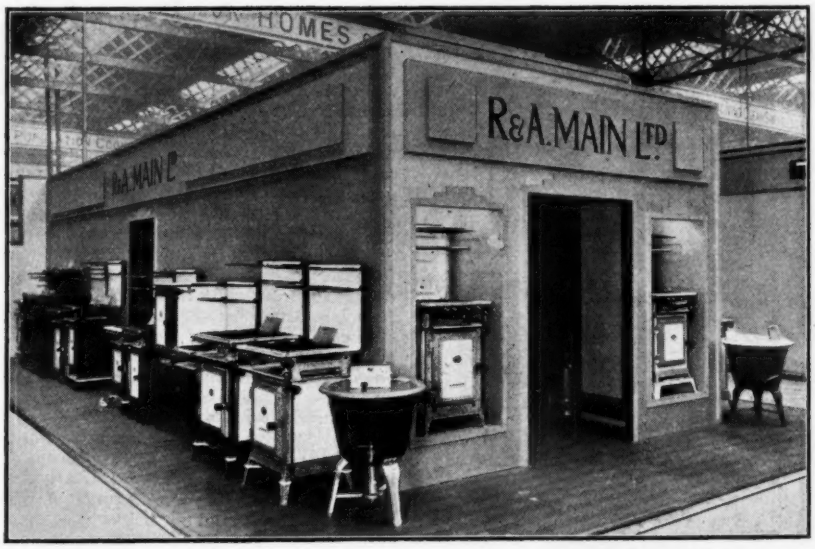
A small-size "Connersville" station meter of British manufacture is to be seen here in operation. The robust character of the whole construction of this meter, both in regard to the internal measuring cavities exposed to the gas, all of which are constructed of cast iron, and the method of aligning and supporting the revolving shafts which are carried on standard Hoffmann ball or roller bearings, gives an impression of dependability which is no doubt largely responsible for the favourable reception that this apparatus has had since its introduction in this country only two or three years ago. It is surprising that, in spite of the fact that the revolving displacement impellers are built in heavy cast iron, a pressure of less than two-tenths of an inch is sufficient to start the meter revolving. The total back-pressure at full output is seldom more than six-tenths of an inch.



"Connersville" Meter Installed for the Bournemouth Gas and Water Company.

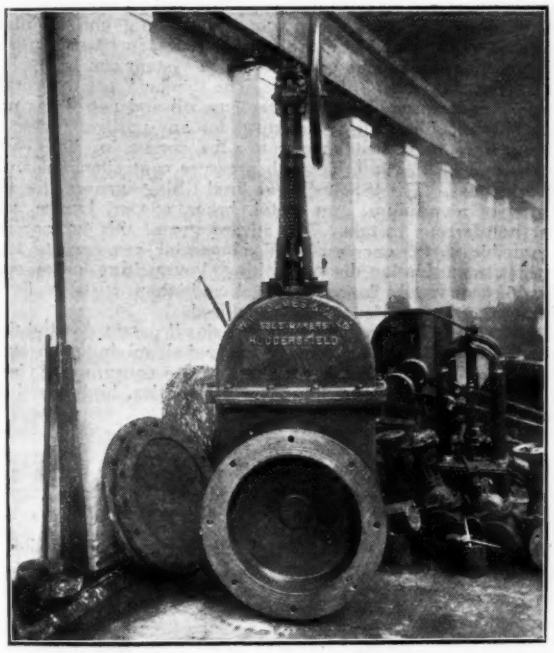
In addition to this, there are models of the firm's various manufactures—such as rotary washers, tar extractors, and double-faced "Western" gas valves. A special feature is the new quick-opening purifier valve, the construction of which is shown. This valve has been widely adopted on account of the simplicity of operation and the safety device for locking in the open and closed position. The position of the valve as to whether it is open or closed is seen at a glance. The use of such a valve on a purification system gives absolute assurance that there can be no leakage of foul gas from one box to another; and all valves can be tested for tightness at any time.

To demonstrate the various advantages claimed for the patent "Dri-gas" plant, there are sectional drawings and testing ap-



MESSRS. R. & A. MAIN'S COMPREHENSIVE DISPLAY.

paratus, together with samples of consumers' meters which have been used on saturated gas and gas treated at the works for moisture removal. Photographs and drawings of the firm's



Quick-Opening Purifier Valve.

new standard type gas condenser, with the patent device for reversing the flow of gas and instant separation and cooling of condensates, are also exhibited.

Horstmann Gear Company, Ltd.,

Newbridge Works, Bath.

[Stand No. 3, Block 12 D.]

This firm are exhibiting a full range of "Newbridge" gas controllers, comprising models for use in ordinary square street lanterns, suspension and harp lamps, &c. The "Newbridge Junior" (type 17) controller is on view for the first time; and

Type 3A/UNI Controller.

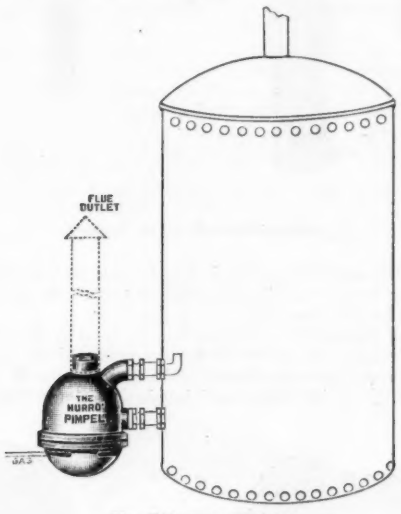
this should attract the particular notice of public lighting engineers. A further point which is of interest to gas engineers is the new distance-control mechanism for domestic use. This is absolutely positive in action, simple to fit, and fully guaranteed. It is priced very moderately; and the makers expect a big demand for it.

Hurry Water Heater Company,

39, Broad Street, Birmingham.

[Stand No. 3; Block 11. K.]

This Company are demonstrating, among other water heating appliances, their new "Hurro Pimpel" water heater,



The "Hurro" Pimpel.

which is constructed of non-corrosive cast aluminium, and is intended for use in connection with existing circulating systems.

Silas Hyde,

99, Snow Hill, Birmingham.

[Stand No. 2; Block 12. H.]

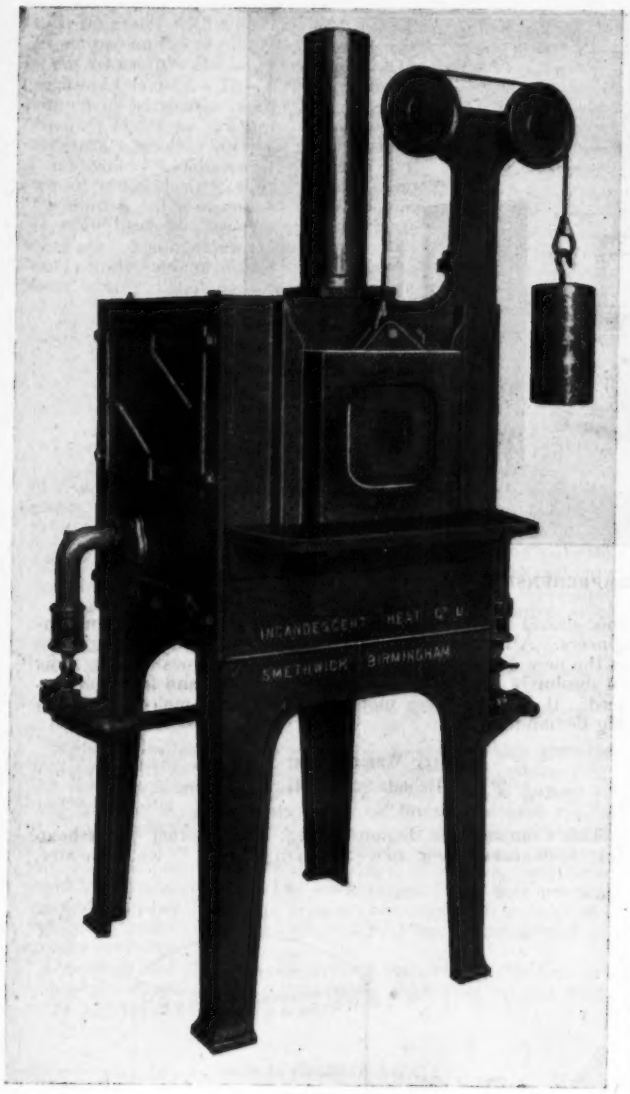
This is another practical furnace display, which is useful in furthering trade applications of gas.

Incandescent Heat Company, Ltd.,

Cornwall Road, Smethwick, Birmingham.

[Stand No. 2; Block 12. J.]

A novel feature of this exhibit is a patent bright annealing machine for the annealing of non-ferrous metal components. This furnace machine is of the conveyor type so that the operation is practically automatic. It comprises a charging table, natural draught gas fired radiant heat muffle annealing chamber, and cooling chamber. The whole of the working chambers are purged with an inert gas which excludes all free oxygen and makes annealing without oxidation possible. The generator of this inert gas is constructed integral with the plant, so that the machine is self-contained. The firm have a number of large plants of similar design in successful operation in the leading



Natural Draught Oven Furnace.

works for the annealing of both non-ferrous and ferrous metals. The furnace section can be operated on town gas, producer gas, oil, coal, coke, or electricity.

There is a standard oven furnace 12 in. by 9 in. by 9 in., which has been designed to meet the requirements of the small engineer, or general heat treatment and repair shop. It is suitable for annealing, carburizing, tool hardening, tempering, reheating, normalizing, &c. The patent incandescent high-speed steel furnace, of the twin chamber type, each chamber 9 in. deep by 9 in. wide by 5 in. high, with door openings 5 in. high by 5 in., will attain a temperature of 1400° C. in the bottom chamber; while the upper or pre-heating chamber, which is heated by waste gases from the lower chamber, will attain a temperature of approximately 950° C. This furnace works on gas at ordinary main pressure and air at 16 to 20 in. water gauge. A new type rapid heating patent incandescent combination recuperative furnace combines the advantage of rapidly attaining all working temperatures of the direct flow non-recuperative type, with the efficiency of the fully recuperative type, without, it is said, the disadvantages of slow-heating inherent in the latter. This furnace, on natural draught, will attain working temperatures up to 1200° C.; and uniform temperatures to within 5° C. with reducing atmospheres can be obtained.

There is exhibited a patent incandescent liquid hardening furnace, which is fired by natural draught gas burners, working on ordinary main gas supply, and is suitable for all temperatures up to and including 875° C. This furnace can be fitted with air blast burners for use with gas at ordinary main pressure and air at 16 to 20 in. water gauge, which is suitable for working temperatures up to 1000° C. The furnace is arranged with top heating, and the waste gases are discharged through a flue situated at the bottom. The main points of the furnace are: Large storage capacity and ideal gas flow, so that the container is evenly heated without direct flame impingement. There are examples of enamelware by the "Pemco" wet process enamels supplied by the Incandescent Heat Company, Ltd., and produced by patent Incandescent Heat Company's enamelling plants.

The firm are also exhibiting the following products of their Associated Company, the Selas Gas and Engineering Company, Ltd., Manchester. The "Selas" patent automatic pre-mix gas and air mixer. The advantages of this system are automatic control, improved results, economy in running and maintenance cost, regular and uniform temperatures, increased output, and greatly reduced over-all costs. The system can be applied to all industrial heating purposes. The "Selas" positive rotary compressor for town gas, producer gas, oil and petrol gas and air. This machine can be arranged for any positive pressures ranging from 10 in. water gauge to 4 lbs. per sq. in. This compressor and blower is fitted with pressure controller and automatic by-pass. The "Selas" gas fired tilting furnace, for the melting of aluminium, gun metal, brass, copper, bronze, and other non-ferrous metals. The advantages of this furnace are no crucible costs, one semi-skilled operator can operate four furnaces, no oxidation during melting, low melting losses, considerable economy in floor space, fuel, and labour costs, no flues, chimneys, or special foundations required.

The stand is illuminated by the "Selas" patent gas lighting system, operated by the automatic gas and air mixing apparatus. The advantages of this system are low gas consumption, long life of lamps and fittings, low price of mantles, high illumination, and cheap cost per candle power.

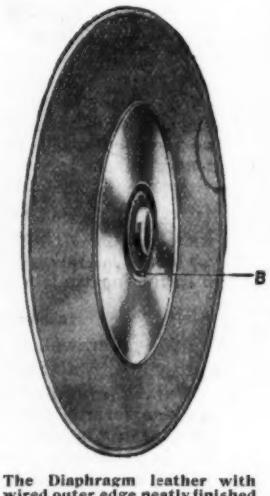
Joymanco (Brighton) Ltd.,

Cambridge Grove, Hove.

[Stand No. 4; Block 11. L.]

Messrs. Joymanco (Brighton) Limited, of Hove, make a special display of their popular "C.P." patent diaphragm. A

The metal rim with top and bottom edges turned at right angles and with groove or recess A on the inner surface.

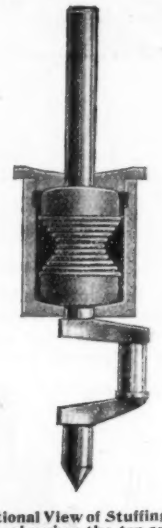


The Diaphragm leather with wired outer edge neatly finished and fitted with metal discs.

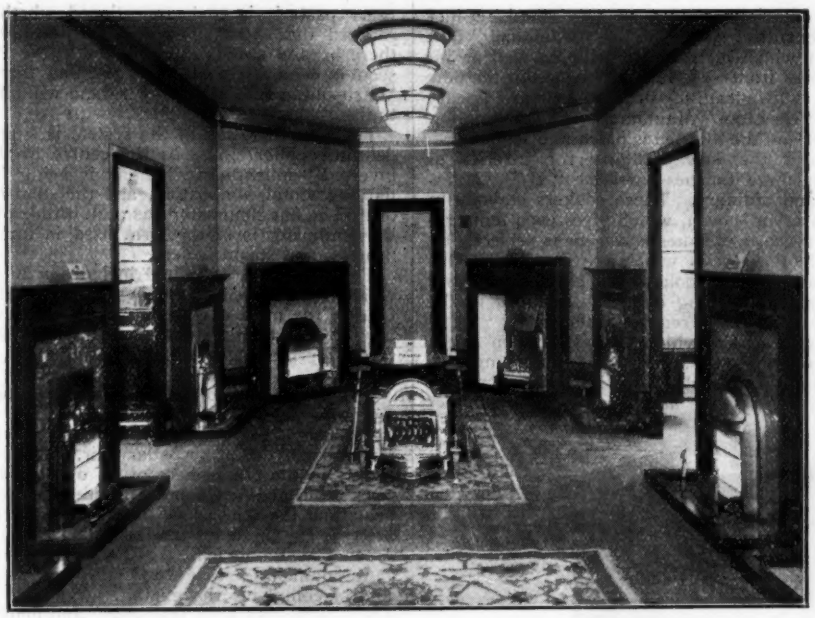
Note the recess B in each disc, which makes a secure seal.

The outer edge of the disc is turned to give a rounded smooth surface in contact with the leather.

The split metal ring which is easily placed into position in the recess A of metal rim and closed with the aid of a special tool of ingenious and registered design.



Sectional View of Stuffing-Box, showing the top and bottom pads with spring mounted upon the flag rod or centre crank.



AN INTERIOR OF MESSRS. R. & A. MAIN'S STAND.

range of sizes is shown, and a special feature of the exhibit is a diaphragm for a 100-lt. meter of the disc type, with the leather in one piece. Various specimens clearly demonstrate the easy method of attaching the leathers to the rim of the "C.P." diaphragm, without employing steel bands, cord, solder, or screws and nuts, and leaving no creases or puckers in the leather. Examples are shown of diaphragm leathers treated with "C.P." dressing, which is offered as exceptionally good for keeping the leathers moist and pliable and preserving them.

A complete range of parts for dry meter repairs is also exhibited, and a No. 3 Standard meter of 120 c.ft. capacity, fitted with glass sides and top, is shown working, enabling the diaphragms to be seen functioning, also the patent stuffing box, which is a distinct departure from usual practice, and contains no wool. The makers point out that considerable trouble has been experienced in obtaining sound stuffing boxes, owing to the very high pressures which are in vogue to-day. The Joymanco stuffing boxes, as used in the demonstration meter, are shown with a portion cut away, exposing the interior and its efficiency as a perfect seal. As will be seen from the illustration, the result is obtained by the use of a top and bottom pad mounted on a coiled spring. Instead of the flag rod rotating inside the stuffing, the coiled spring, being attached to the rod, rotates with the latter. Apart from making a perfect seal, this acts as a tension on the meter, and tends towards eliminating fast registration.

Lighting Trades, Ltd.,

30-31, Farringdon Street, E.C. 4.

[Stand No. 2; Block 12. G.]

Lighting Trades, Ltd. (who incorporate J. & W. B. Smith, Ltd.), are making a representative display of the gas lighting and heating equipment which they supply. Mantles form a prominent part of the exhibit. There are mantles for every system of lighting—gas, oil, petrol, acetylene, &c.—of both hard and soft types. A lighting fitting in the form of "Renown" magnesia superheater cluster burners will doubtless attract considerable attention. "Renown" burners do not corrode, consequently they retain their efficiency for a longer period than superheaters made of metal. Another important advantage from the domestic user's point of view is that ordinary glassware can be used with them.

The "Glasmi" gas fire, and a display of high-class lighting fittings, pendants, brackets, shades, floor standards, &c., complete the display.

Situated between this firm's stand and that of the Welsbach Light Company is a working exhibit of the principal operations in the manufacture of gas mantles, which has been arranged jointly by the two Companies. These operations include knitting of ramie yarn, sewing and looping of upright mantles, fixing of rings to inverted mantles, strengthening of the vulnerable parts of both upright and inverted mantles, and burning-off and shaping of both types by means of high-pressure gas. It is, of course, not possible on an exhibition stand to demonstrate each of the many intricate operations involved in the manufacture of mantles; but visitors will obtain an accurate impression of the method of manufacture from the processes which are being carried out. In addition, there are on view samples of the raw materials and chemicals used.

Donald Macpherson & Co., Ltd.,

Knott Mill, Manchester.

[Stand No. 2; Block 12. E.]

Information about what is claimed to be the latest and most important discovery in the history of anti-corrosive paints—sublimed blue lead—is obtainable at this stand. There are also other extremely interesting exhibits. One of these is a special apparatus used for testing "Foochow" paints under conditions approximating to sixty times the severity of normal atmospheric conditions. One can see how "Foochow" paint is subjected under test to exposures equivalent to a period of upwards of two years' in actual use. It is not necessary to stress to paint buyers the importance of such tests—typical of the care with which all "Foochow" products are prepared and proved—but a few minutes with the actual apparatus will explain more clearly than any number of words the reason for the consistently fine results obtained with "Foochow" paints.

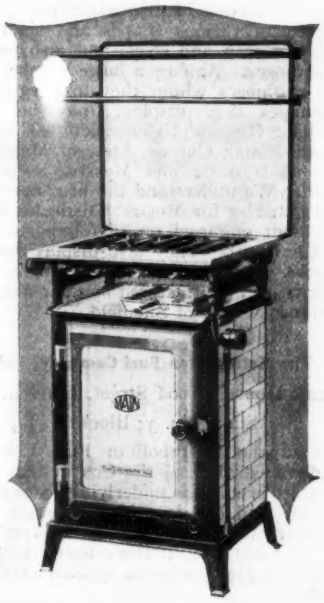
The stand is decorated with the firm's own material, to demonstrate their high-class paints, varnishes, and enamels, which are suitable for use in connection with gas showrooms, meter houses, engine rooms, offices, &c.

R. & A. Main, Ltd.,

Gothic Works, Falkirk.

[Stand No. 1; Block 11. E.]

The great advances which scientific research and experiment have made in gas cooking and heating appliances are

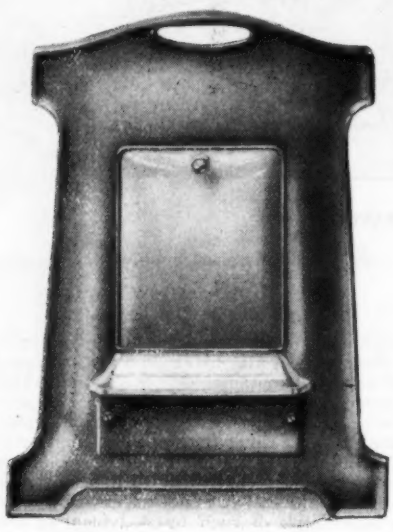


"Mainservor" Cooker, in Intermediate Finish.

exemplified in the productions shown on this stand. Chief among these are the beautiful specimens of "Mainamel" (all-enamelled) cookers, in which all parts—outside as well as inside, and back as well as front—are fully enamelled in the new hard-wearing finishes, with gleaming surfaces that are as easy to clean as china. The De Luxe "Mainamel" is a combination of white and blue-grey, and the mottled is black and white.

There is also shown the new "Mainservor" series of cookers, obtainable in three finishes—mottled "B" "Mainamel," intermediate, and ordinary. These cookers embody in their design the "Conservor" oven, which gives even temperature all over the oven space, and bakes and browns perfectly on every shelf. Like all other series which are fitted with this patent oven, the "Mainservor" cookers can be obtained with the "Mainstat" automatic cooking control. Included in the exhibit are cookers for all domestic requirements.

Gas fires of varied designs—of which special mention might be made of the "Baronial" series, with their interchangeable canopies and fenders of art metals, and the "Mainscreen," which can be used as a fire in winter and a fire-screen in summer



A Fire-Screen in Summer.

—are also displayed in a selection of finishes, including chromium-plated. Large cooking apparatus for hotels, wash boilers, radiators, and "Novocrete" economy flue blocks are included in the exhibit.

Meltham Silica Fire Brick Company, Ltd.,

Meltham, Huddersfield.

[Stand No. 2; Block 11. K.]

These manufacturers of highly converted silica bricks are again in evidence with an excellent display of their products. The exhibit consists principally of a built-up silica coke oven wall, and a built-in section of silica segmental gas retorts, with a general display of various shapes and sizes for the heavy industries—such as iron and steel—and also for chemical and glass works purposes. Among a large number of well-known constructional engineers whom they are regularly supplying, and whose shapes they display, may be mentioned the Woodall-Duckham Oven and Construction Company, Ltd., of London, Messrs. Simon Carves, Ltd., of Manchester, Messrs. Drakes, Ltd., of Halifax, and Messrs. Robert Dempster & Sons, of Elland. We understand the firm have supplied many full coke oven batteries for Messrs. Disticoke & Co., of Paris, and are at present engaged on two important contracts for them on the Continent. They also display varied samples of super-refractories, such as magnesite, chrome, and sillimanite bricks and blocks, as manufactured by their allied firm, Messrs. Pickford, Holland, & Co., of Sheffield.

The Metropolitan Fuel Company, Ltd.,

Millbank House, Wood Street, London, S.W. 1.

[Stand No. 3; Block 11. J.]

The exhibit of the Metropolitan Fuel Company, Ltd., is devoted to a demonstration of the Cox system of surface combustion. To state briefly the underlying feature of this system, a mixture of air and gas is passed through a specially prepared porous refractory called a "combustor," and when ignited on the outgoing face, it there burns without flame, and the surface only of the combustor quickly attains a high state of incandescence.

Though the existence of this apparatus, in some of its forms, has been known to the majority of gas engineers for several years past, it is to be questioned whether many have fully realized the extent to which its use has developed. Should there be any among the visitors to the Fair who have never seen it demonstrated, they will find that the lay-out of the Metropolitan Fuel Company's stand will offer them every opportunity.

The demonstration of the system is supplemented by various definite applications. In the centre of the stand is a large inverted "mushroom;" the body being formed of a series of flat segmental combustors, and the stem of a tubular combustor. The flat combustor has a multitude of uses; and the tubular combustor is of the form used in immersion tanks, water heaters, and steam boilers.

The apparatus exhibited includes a metal melting pot, for which a fast speed of melting and high efficiency are claimed. One of the most extensive uses of combustors is for the melting of low temperature metals, such as lead and tin mixtures, for the engineering, printing, and, above all, the wire trade.

The application to cooking takes the form of a salamander, next to which is seen a tubular combustor burning under water in a translucent quartz tube, closed at one end and with no through current of secondary air. The combustor burns efficiently in the atmosphere of its own products.

Two furnaces are demonstrated—one a semi-muffle with top-heat, and the other a vertical tubular furnace, a miniature of the type employed for the hardening of gun tubes at the Royal Arsenal at Woolwich.

An enamelling stove fitted with combustors and thermostatic control completes the exhibit. A Foster automatic recording dial is in circuit with this stove, and demonstrates beyond dispute the maintenance of even temperature.

National Gas Engine Company, Ltd.,

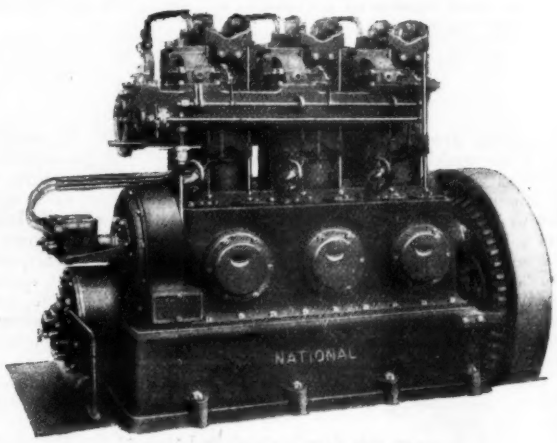
Ashton-under-Lyne.

[Stand No. 1; Block 12. J.]

The exhibits made by this company are as follows:

"CWE" Type Single-Cylinder Horizontal Heavy Oil Engine.—Designed for running on the cheapest oils. Starts-up immediately from cold by means of compressed air. No highly compressed air or complicated spring is used for the injection of the fuel; it being delivered by direct mechanical means, through specially constructed atomizers, into the combustion chambers, thus ensuring perfect combustion in the most economical manner. Engines of this class are built in standard sizes up to 130 B.H.P., and of the twin-cylinder type up to 260 B.H.P.

Three-Cylinder Vertical Gas Engine 75 B.H.P. on Town Gas.—The reciprocating parts are totally enclosed, and lubrication is effected by means of a pump supplying oil under pressure through the crankshaft to all bearings. The gas and air are kept separate for each cylinder right up to the respective inlet valves, which are of the overhead type. The regulation of the mixture is effected by the main regulating valve controlled by a centrifugal governor. Water cooling is of the open type, and ignition is effected by means of high-tension sparking plugs, of which there are two in each cylinder.



Three-Cylinder Vertical Gas Engine.

"MHE" Type Engine and Chain-Driven Dynamo.—The engine is of the horizontal tube starting type, using cheap heavy oil as fuel. In the general construction the firm have retained the high-class principles of their cold-starting heavy oil engine, and have incorporated an ignition tube in connection with a vaporizer. This tube is heated by means of a lamp; the time required not exceeding three minutes. Such parts as the breech end, sprayer, and fuel pump, so vitally important in a heavy-oil engine, have been specially designed with the greatest care. The dynamo is of the Electric Construction Company's manufacture.

"K" Type Gas Engine.—Horizontal, single cylinder, 6 max.

B.H.P. on town gas—the development of over forty years' experience in the manufacture of engines of this class. It embodies all the latest improvements.

"F" Type Petrol-Paraffin Engine and "C" Size Ram Pump.—This is one of the firm's new productions. The engine is of the horizontal type, capable of developing $2\frac{1}{4}$ to $2\frac{3}{4}$ max. B.H.P. at 800 to 1000 R.P.M., and is connected to the pump through gearing; the set being complete upon one baseplate. The output is 1000 gallons per hour against a maximum head of 150 ft. The engine is of robust proportions, reliable, and economical. The pump has few working parts, and is extremely efficient. This set is eminently suitable for pumping small quantities of water or oil.

"F" Type Gas Engine and Direct Coupled Dynamos.—A neat and efficient lighting set. The engine is of the horizontal totally enclosed type.

"F" Type Petrol-Paraffin Engine and "A.C.3" Compressor.—For the starting-up of engines, or any purpose where a small quantity of compressed air is required. The set is mounted on one baseplate; the engine being connected to the compressor by belt. The set exhibited has an output of $3\frac{1}{2}$ c.ft. of free air per minute, at 275 lbs. per sq. in.; and the engine is arranged for hopper cooling.

Omnia Manufacturing Company, Ltd.

14, Gonville Road, Thornton Heath.

[Stand No. 5; Block 12. A.]

There is to be inspected here a novelty in the form of the "Omnia" geyser, which consists of three water heating units—the outer, intermediate, and inner. The water enters at the usual cup on the top cover. It is then conveyed into a trough suspended within the cover. From the centre of the trough the water passes to the domed top of the intermediate unit. The centre of the domed top is provided with a single slot, which permits a suitable quantity of water to enter, and fall on to the top of the inner unit, while the rest of the water is distributed to the outer and intermediate units. The total water from the three units unites in a trough at the bottom of the geyser, and so passes through the usual outlet spout.

The intermediate and inner units are of novel design. The intermediate unit consists of a cylindrical member suitably perforated for the free passage of the burnt products of combustion. This member is provided with a number of vertical boxes which fill and overflow with water. The inner unit is particularly interesting. This consists of a cylindrical member, the wall of which is perforated with a number of large holes. On the water side of this member each hole is provided with a suitably shaped plate, which directs the water around each hole, without permitting any to pass through the holes into the burner zone. The effect of this arrangement is that greater gas consumption is possible, with complete combustion. Therefore the dangers of overloading are considerably lessened. No attempt is made to trap the heat, yet the loss is stated to be negligible. A copper flue pipe will not discolour. The efficiency claimed is over 95 p.ct.

Parkinson & Cowan, Ltd.,

Bell Barn Road, Birmingham.

[Stand No. 1; Block 12. F.]

This firm are showing a complete range of gas meters. These embrace both the wet and dry types, and the patterns used for ordinary consumers and for those who are supplied on the prepayment system. A great variety is shown, and included in these are high-capacity dry meters of the latest types, and also a number of special patterns of wet meters, including the "Duplex." They have on view the rotary meter; and where it has not been possible to show the actual meter, models are exhibited. There are also several examples of test meters as used for experimental purposes.

In dealing with lighting for streets and outdoor spaces, the firm again show a very varied assortment of square, circular, hexagonal, and arc lamps. There are also on view the "Blackpool" pattern lamps, with the burners arranged in tiers, and a similar arrangement fitted into arc lams ("1100" and "1200" Series). This design for the placing of the burners is said to result in a very important increased illuminating effect from any given number of mantles. This increased illuminating effect, it is pointed out, is obtained partly by the fact that in this design the loss caused by the mantles screening one another is very largely avoided; and it is also due to the mantles being placed farther apart, which results in an improved and increased diffusion of the light. The design is intended mainly for important positions, and the advantages obtained are much more marked with a large unit. The latest types of pre-heated inverted burners are shown, both when fitted in lamps and separate. These are now usually supplied metallized, thus avoiding the corrosion caused by the constant contact of the products of combustion.

The "Beasley" recording gas calorimeter is exhibited, and is in action on the stand, giving a continuous record of the calorific value of the gas supplied. It is fitted with the patent correcting device, which controls the volume of gas delivered to the burner, so that the chart shows the results in B.Th.U. per c.ft., corrected to normal temperature and pressure. As the meter fixed in the instrument also works at its proper speed irrespective of variations in the density of the gas, and the water-lining of the meter is automatically controlled, this recording calorimeter, as now exhibited, requires extremely little attention, and yet is remarkably accurate.

"Blackpool" Lamp.

[Patent Applied For.]

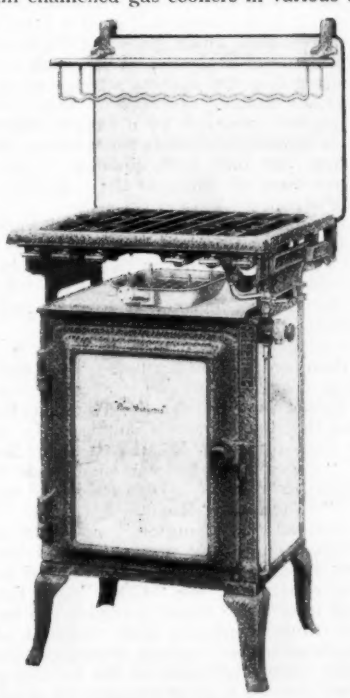
Pressure gauges are shown in great variety. Besides the well-known double-tube gauges, a very attractive feature is to be found in the single-tube patterns, which have special advantages for many positions. In addition to the items mentioned, there is a variety of other apparatus, including retort house governors with distant control, station governors, main thermometers, vaporizers, force pumps, and water meters.

Parkinson Stove Company, Ltd.,

Stechford, Birmingham.

[Stand No. 1; Block 12. F.]

There is here to be seen a representative display of the most modern types of gas cooking, heating, and hot water appliances. To be noted particularly is the fine display of high-grade porcelain enamelled gas cookers in various finishes. At-



The "New Suburbia" in Mottled Enamelled Finish.

tention is focussed on the Parkinson " New Suburbia " cooker —with top and bottom oven flue outlets—which embodies several new features, and is claimed by the makers to give the best possible cooking results with the minimum gas consumption.

This cooker embodies in its construction all the best features of the double-burner top-flue type of oven. It has two flues, each having a distinct and useful function to perform—the top flue to govern the ventilation of the oven during the initial stages of heating-up, and the bottom flue to ensure complete circulation of the hot gases throughout the oven when combustion has attained stable conditions. The top flue is thermostatically controlled by a patented device, which ensures that this flue is wide open during the period of heating-up the oven, and offers the most efficient method of ventilating the moisture, or condensation, produced by contact of the hot gases with the cold frame of the oven interior. It also ensures an adequate supply of pure air (known technically as secondary air) to support the combustion of the gases. When complete combustion is assured, proper circulation of the hot gases set in motion, and the oven free from condensation, this top flue is automatically closed off and the bottom flue operates, giving an increase in efficiency. When the top flue has closed-off and the bottom flue is in operation, the circulation of the hot gases throughout the oven is complete, which results in a further increased efficiency, and enables the whole of the interior of the oven to be used for cooking purposes.

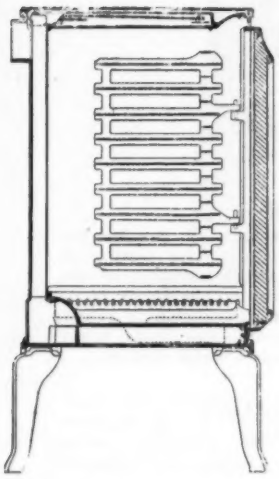


Diagram A, showing thermostatically controlled top flue outlet.

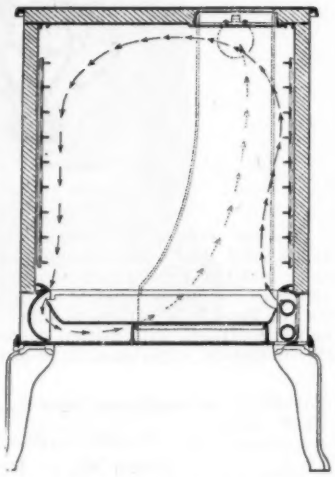


Diagram B, showing passage of the hot gases (as indicated by arrows).

The Parkinson " New Suburbia " oven is fitted with an oven heat control thermostat, which gives the highest peak of efficiency and the acme of economy. With each cooker there is supplied a chart giving the various settings of the thermostat suitable for various cooking operations. When the thermostat is set to its requisite position, by a simple adjustment of the dial the oven is in complete automatic control. It requires no further attention, and only such quantity of gas will be consumed as is necessary to maintain the requisite cooking temperature in the oven.

Other models on view include the well-known " Suburbia " gas cooker, the " Standard " cooker of the National Gas Council, the " Liverpool " cooker (a moderately priced stove combining reliability with economy), and the " Cabinet " one-level cooker, by the use of which stooping and bending are noticeably absent during cooking operations.

The display of Parkinson hygienic gas fires is certain to attract more than ordinary attention. Extremely interesting because of their chaste designs and perfect finish are the " Meyrick " and " Talbot "—the latest designs of gas fires put on the market by the Parkinson Stove Company. In addition, mention may be made of the " Westminster," " Bournemouth," " Haddon," " Chatsworth," " Ripon," and " Harrogate " fires, in various art finishes. Less expensive models are the " Edmund," " Ratcliff," " Raymond," and " Edwardian " fires. The popular " Kennington " and " Stechford " fires are also exhibited, including an example of the latter with boiling burner in canopy. Specially designed to fit in front of an existing coal grate, the " Cosie " gas fires attract attention. Four alternative types of fender can be fitted to the " Cosie " fire, thus ensuring a wide range of adaptability to meet the requirements of various settings. The Parkinson Stove Company were originators of the built-in gas fire register, which has achieved a great measure of popularity among architects, builders, and those responsible for municipal housing schemes. Three of these built-in fire registers are to be seen on the stand.

The Parkinson Stove Company are the makers of Parkinson-Maughan geysers (the original make), and have many popular types of geysers and other water heating appliances on show, including the well-known " Treasure," " Teba," " Simplice," " Pearl," " Gacylette," and " Holborn " models.

Peebles & Co., Ltd.,

Tay Works, Bonnington, Edinburgh.

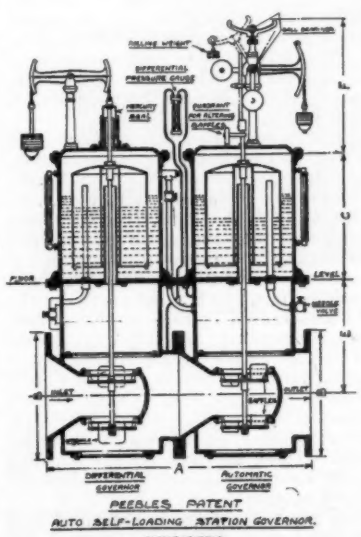
[Stand No. 4; Block 12. D.]

This firm are showing gas meters and several of their special gas governors. The meters comprise standard, ordinary, high-capacity, a special small cased meter, and the prepayment meter. The special points of interest in these designs are particularly the patent telescopic diaphragm, fixed to the rim by an endless coiled spring, which, while keeping the diaphragm absolutely gas tight, allows for all small irregularities in the thickness of the leather. The diaphragm is held by the spring in equal tension all round; and there is no fear of cutting the leather. No heating or soldering is required.

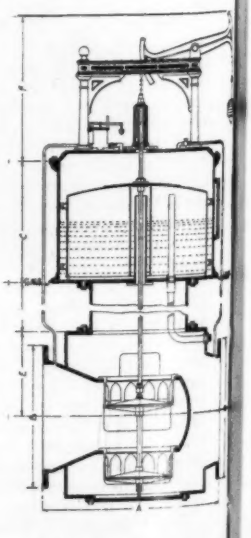
Finished Diaphragm, Inflated.

The next important feature is the patented cork stuffing for the spindles, which, while tight at all pressures, causes far less friction than is the case with ordinary stuffing, and there is no need for lubrication beyond the original graphite dressing, which gives smoothness of working without noise. There appears no sign of wear or deterioration of any kind, even after prolonged use. The prepayment meter of the front change plate type has the attachment and valve outside the meter; the operating spindle passing through a small stuffing box, so that the meter is gas tight. In the high-capacity meter the valves are enclosed in the usual valve chamber. The top of the meter is not used as a passage, and is consequently an extra protection against leakage.

Messrs. Peebles & Co. also show their station and district governors. For years they have supplied pressure-loaded district governors, and more recently the principle has been used with their station governors. The original patent for pressure loading was granted to the late Mr. D. Bruce Peebles in 1875; but it did not seem to be appreciated. In recent times, with the heavier pressures to be dealt with, this system has come into vogue, and is likely to be very widely used. The alteration of the pressure by a clock is now very easily carried out. A clock arrangement is shown dealing with weekday pressures and a special pressure chart for Sunday. A pilot governor loads the main governor from the inlet gas pressure. The loading of the pilot governor is carried out by means of a small cup of mercury attached to a lever acting on its spindle. The



Station Governor—Self-Loading.



Station Governor—Pressure Loaded.

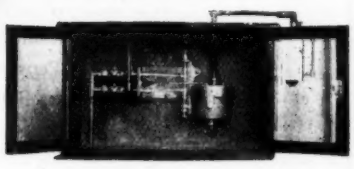
THE PARKINSON STOVE COMPANY'S DISPLAY.

clock sends a small plunger of any desired shape into the mercury; the buoyancy increasing the load gradually or in steps, as required, to any extent. A cam driven by the clock deals with the weekday pressures, while a separate cam is brought into action for Sunday. The change-over from one cam to the other automatically takes place, usually after midnight on Saturday and Sunday. The cams are alterable for sunset, and may be combined for different days of the week. This is a most interesting development of pressure loading.

The ideal governor for station governing is the patent self-loading governor, which increases the pressure according to the load. Want of space makes the display of the governor a difficulty; but the automatic arm with a running weight is shown attached to the counterbalance lever fitted up on the cover for the automatic unit.

The "B.V.R." patent governor is of the relay type moving a butterfly valve. A small supply of air or gas at high pressure (about 5 lbs. per sq. in.) acts on either side of a piston attached to the butterfly. A light diaphragm in communication with the point at which constant conditions are required moves a little double faced valve against one or other of two small nipples opposed to each other, and on the line of the high-pressure air supply. When a nipple is closed, the pressure is at once built-up on that side of the piston to which it is connected; the other nipple acting as the exhaust for the other side of the piston, and vice versa. The movement of the piston at once moves the butterfly. To show how delicate it is, the diaphragm can be moved by waving a sheet of paper lightly in front of it. One illustration shows the butterfly valve and operating cylinder; while the other illustrates the small diaphragm control. This governor is useful for retort house governing, but is also suitable for any other conditions.

Butterfly Valve and Operating Cylinder.



Small Diaphragm Control.

"B.V.R." (Butterfly Valve Relay) Governor.

Other exhibits show the numerous governors for consumers', street lighting, and domestic individual lights; while Peebles' jet photometer and heat indicator are also on view.

Radiation Limited.

Thimble Mill Lane, Aston, Birmingham.

[Stand No. 1; Blocks 11. F. and 11. G.]

The exhibits of the six constituent firms of Radiation Limited are described under their respective names.

Rainsford & Lynes, Ltd.,

Emil Street, Birmingham.

[Stand No. 1; Block 12. A.]

This firm are exhibiting a very comprehensive range of gas main cocks, unions, and other brass fittings of particular interest to gas engineers and managers of gas undertakings. These fittings represent the result of fifty years' experience, and embody all the improvements which modern developments require. All fittings are adequately tested to ensure thorough soundness. Particular care is taken to remove all grinding material from the bearing surfaces of cocks; and in the final assembly no abrasives are employed. In this way the life of each cock is very considerably increased.

Richmonds Gas Stove Company, Ltd.,

Grappenhall Works, Warrington.

(Radiation Limited, Proprietors.)

[Stand No. 1; Blocks 11. F. and 11. G.]

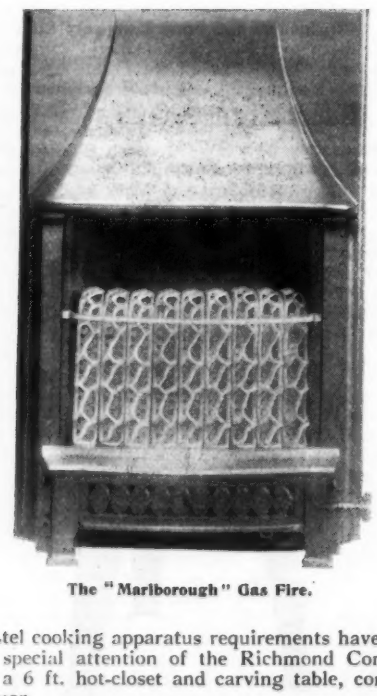
The "Bungalow New World" gas cooking range upholds the Richmond tradition for thoroughness and the rapid assimila-

The "Efficiency" Wash Boiler.

tion of new ideas and requirements into practical form. This range carries simplicity of working to the farthest point, and at the same time its appearance lacks nothing that would help to please. The flint-hard porcelain enamel of the "finish" is entirely reliable in resistance to wear, and its cleaning is a matter of moments only. This range has all the popular "New World" features of "Regulo" oven heat control, &c. A "Bungalow New World" cooker of smaller capacity, all mottle-enamelled, is also seen.

Richmond's "Bungalow New World" Cooker.

Among several exceptionally handsome designs of gas fire, the well-favoured "Marlborough" must be given pride of place, providing as it does so elastic a range of usefulness in one single but skilfully-proportioned design. It is shown with a useful side-boiling burner. The new Richmond "wood" finishes have a well-chosen representative in their "Renaissance" model, displayed in "figured oak." The fidelity of this example to the original oak must be seen to be fully appreciated; and this applies equally to the other "woods"—quartered mahogany, &c.—included in the series.



The "Marlborough" Gas Fire.

Large hotel cooking apparatus requirements have always engaged the special attention of the Richmond Company, and they show a 6 ft. hot-closet and carving table, complete with overhead gear.

The housing section of the stand has several contributions, including the "Cavendish" mantel register, complete with gas fire, the "Efficiency" wash boiler in mottled porcelain enamel, and two very suitable gas cookers—Clark's "Severn" (in mottled porcelain enamel) and Richmonds' "Ranelagh New World." A "Don" geyser, finished in delightful

The "Severn" Cooker.

bronze, and one of Richmonds' latest "Hollar" boilers, are outstanding exhibits among the water heating appliances. One of Clark's "Apex" radiators is also shown, and, with the "Fairy Queen" gas iron in porcelain enamel finish, completes the list of the Grappenhall Works productions.

Stewarts & Lloyds, Ltd.,

41, Oswald Street, Glasgow.

[Stand No. 1; Block 11. D.]

A special display is made here of wrought-iron tubes, to the specification of the Institution of Gas Engineers. There are included samples of tube strip with analysis, and of test-pieces after being subjected to the tests laid down by the Institution. Ordinary screwed and socketed tubes are well represented, as are also steel tubes with welded joints and spigot and socket joints for lead and yarn. "Victaulic" joints and fittings are on view; and, in addition, working models are shown on another stand which the firm have in the General Engineering Section, which demonstrate the unique advantages of this joint.

Many of the firm's specialities which have long been known to the gas industry can be inspected.

Stourbridge Refractories Company, Ltd.,

Shut-end Works, Pensnett, near Dudley.

[Stand No. 6; Block 12. D.]

Here are shown vertical, horizontal, and segmental retorts, special blocks for generator and regenerator settings, &c.

Submerged Combustion, Ltd.,

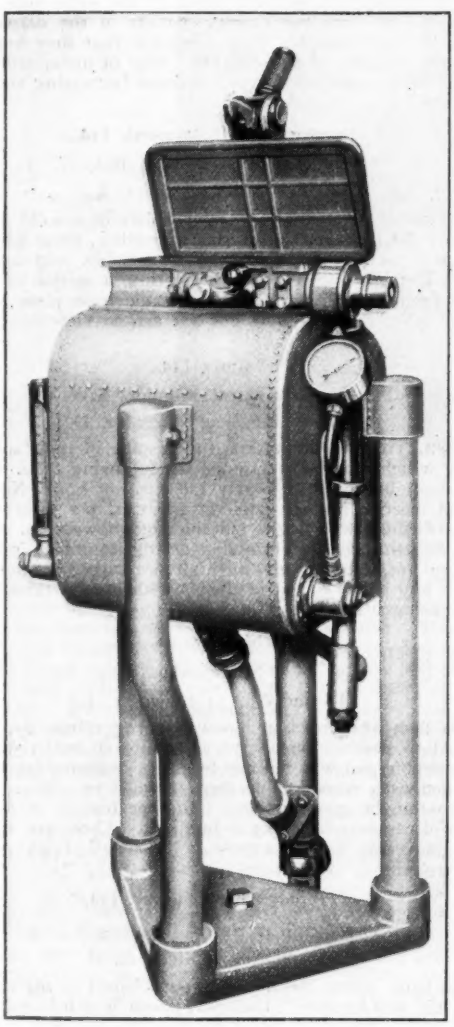
28, Victoria Street, London, S.W. 1.

[Stand No. 5; Block 12. C.]

Submerged Combustion, Ltd., as the name suggests, are exhibiting the Hammond system of submerged combustion, in which a burner producing an unquenchable flame is applied to a number of industrial heating problems such as central heating, metal melting, chemical evaporation, and chemical process

work, and to the textile, dyeing, and bleaching industry—to name just a few of the applications of the system.

One piece of apparatus exhibited on the stand is a simple glass vessel in which the flame from a Hammond burner supplied with town gas is seen burning openly in water at a depth of 10 in. There is no limit of depth to which this flame may be submerged. A practical industrial application of the principle is illustrated in the form of a Hammond vortex dyeing drum—a machine designed for use in the dyeing and cleaning trade for dyeing made-up goods, such as hats, jumper suits, shirts, skirts, hosiery, &c. In this machine, in addition to heating the dye liquor, a vortex is created by the action of the flame sufficient to dispense with any paddle or other mechanical means of turning the goods over in the liquor, so that even and uniform dyeing results, with no fear of felting or otherwise damaging the fabrics. A third piece of apparatus of peculiar interest is a metal melting unit having a throughput of 1000 lbs. per hour when engaged in lead melting. The thermal efficiency of the system is said to be very little short of 100 p.ct.; temperature equilibrium between the combustion gases and the fluid in which the flame is submerged being arrived at instantaneously.



Hammond Vortex Dyeing Drum, Gas Fired with a Hammond Combustion Unit of 30,000 B.Th.U.

The combustion units in operation on the stand are all operating at 30,000 B.Th.U. output per hour. Three sizes of combustion unit are exhibited, having 60,000, 100,000, and 375,000 B.Th.U. per hour capacities respectively. These, as applied to the various types of plant for which they are designed, may be employed singly or in groups of two or more, according to the requirements of the job in hand. Burner units up to 1,000,000 B.Th.U. are already standardized; and where it is seen to be necessary, larger units will no doubt be standardized. It should be pointed out here that the load factor in the combustion chamber is claimed to be the highest ever attained in combustion practice; for the units in operation on this stand have a load factor of 20,000,000 B.Th.U. per c.ft. of combustion chamber space per hour. At this throughput, the combustion chamber linings appear to be indestructible.

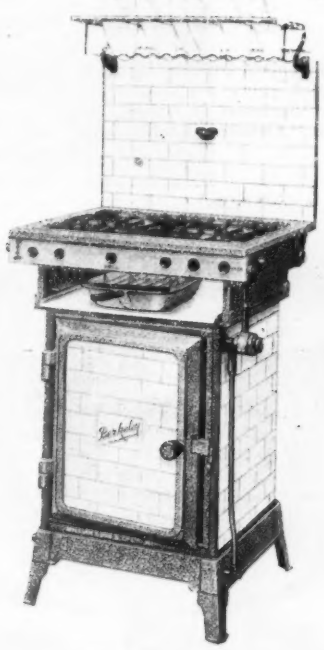
The associated equipment includes a specially designed proportioning valve for supplying the correct mixture of fuel and air, whatever may be the output demanded. This proportion of fuel and air, once set, remains constant at all outputs. Two examples of the Hammond proportioning valve are exhibited, and integral with these valves are carefully designed non-return valves to meet the contingency of failure of the air or fuel supply or both. These valves are of simple and robust construction, offering a minimum of resistance to the flow of gas or air, and being so constructed that they may be removed in an instant for inspection or replacement.

William Sugg & Co., Ltd.,

Ranelagh Works, Chapter Street, London, S.W. 1.

[Stand No. 2; Block 11. H.]

This is a very comprehensive exhibit; cooking, heating, and lighting being all catered for. For domestic cooking, first and foremost comes the " Berkeley " series of cookers, which look extremely smart in their mottled enamel finish with tiled panels and plate rack, and their unique system of control by switch-taps. The last named is a useful contribution to the labour-saving movement, since the usual metal taps and fittings are replaced by a neat white enamelled switchboard, having only the heads of the switch-taps protruding. No less than seven different models are comprised in this series; and the claim that it offers a cooker for every household purpose is therefore fully justified. It is apparently Messrs. Sugg's policy to offer such improvements as this switch-tap control represents, but still to cater for those of their customers who prefer the orthodox; for the exhibit includes also two of these " Berkeley " cookers provided with fan taps and two of their well-known



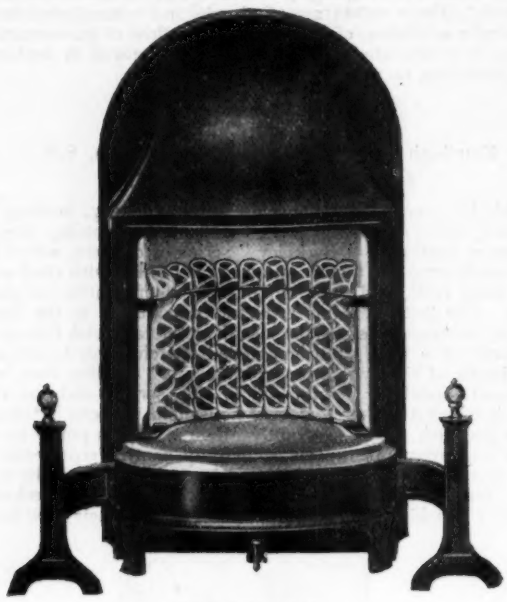
"Berkeley" Cooker.

" Chef " cookers, in all-enamel finish, with nickel-plated float-rail and fan-taps. A neat small cooker, suitable for flats and maisonettes, is the " Swift," of which two models are shown; while the two gas coppers or boilers—the " Marlboro " and the " Trafalgar "—and the incinerator displayed in this section are all valuable adjuncts to any household, large or small. Those concerned with cooking on a larger scale, as in hotels, restaurants, and institutions, will be interested in the " Westminster O.O.," " Compact," and " Criterion " cookers, the " Alexandra " and " Avenue " hot closets, the " Sutherland " baking oven, and other units representative of the firm's activities in connection with large cooking apparatus.

Heating by gas is demonstrated by the " Red-Sphinx " gas fires, with their unique incurved fuel formation and the patent atomizer, which ensures silence in lighting, burning, and extinguishing. An imposing array of models is on show; those which are encased in antique brass or copper or in rustless steel being particularly attractive.

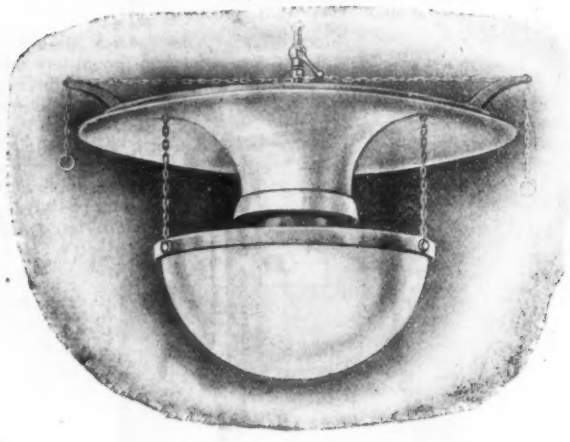
The lighting side of the industry is well represented by a comprehensive display of lamps and fittings for all purposes. For street lighting—a very important section—there are the upright " Littleton " lamp, the " Promenade " lamp, and the " Windsor " square lamp—all with clock controllers. There are a " Grosvenor " lamp and a " Rochester " suspension lamp

with patent distant control device. The latter, by the way, can equally well be provided with a clock controller. It is rapidly gaining favour for public lighting, being carried either in a swan neck surmounting a column or from tramway standards.



"Red Sphinx" Fire.

For shop and general interior lighting many attractive lamps, pendants, and burners are displayed—including the "Littleton" and "Surbiton" lamps, and "Unique," "Bon Marché," and "Osborne" lights. An item of particular in-



"Bon Marché" Light.

terest on this side is the "King's Hall" ventilating ceiling light, which combines perfect illumination with definitely efficient ventilation—a double purpose which no other illuminant can serve.

Messrs. Sugg's stand is provided with a test bench, at which many interesting demonstrations are given and a number of sections displayed, showing the working of the firm's patent distant control device, governors, and other specialities.

A. G. Sutherland, Ltd.,

Warwick Road, Greet, Birmingham.

[Stand No. 4; Block 12. H.]

Here are shown various types of dry gas meters—ordinary, prepayment, gas fire, and high capacity. The Company's prepayment attachment is designed with a view to simplicity, combined with accuracy and strength. The range is from 6 to 45 c.ft., and price changing is instantly effected. The "Warwick" gas fire meter is a small type, having a capacity of 30 c.ft. per hour. It is made for 1d., 6d., or 1s., and is supplied with a special key to enable the owner of the meter to close the valve *in situ* at will. Open meters of various kinds are shown for closer examination; and glass demonstration meters are to be seen working.

Sutherland Meter Company. Ltd.,

Electric Avenue, Witton, Birmingham.

[Stand No. 3; Block 12. E.]

One of the Section's displays of meters, fires, lamps and lanterns, testing apparatus, &c., is to be found here.

John & Joseph Taunton, Ltd.

Belgrave Works, Sherbourne Road, Birmingham.

[Stand No. 4; Block 12. E.]

The feature of this stand is an exhibit for the first time of a working model of a meter fitted with mercury sealed glands. The glands (which do away with the method of using yarn and grease for packing of stuffing boxes) are made of chromium steel, and are constructed in such a manner as to give a permanent seal of 1 in. of mercury, which will withstand a pressure of approximately 13 in. of water. This invention is a real attempt to solve the problem of leaks in stuffing boxes. The firm also show the various sizes in high capacity meters, in the manufacture of which they have aimed at forcing the meter to work more slowly, while at the same time passing more gas. By avoiding racing, the life of the diaphragm is considerably prolonged. They point out that they have quadrupled the capacity of the "lights" type of meter and doubled that of the "standard" type, without increasing the size of the meter.

Joseph Taylor (Saturators), Ltd.,

Blackhorse Street Mills, Bolton.

[Stand No. 2; Block 12. A.]

The exhibit of the above firm consists of a solid plate lead saturator for hand fishing or steam ejecting, fitted with double detachable ammonia pipes, and detachable acid and steam pipes. There is shown for the first time a section of an outer casing for a centrifugal apparatus made from plate lead; and various other samples of lead work are on view.

Tilley Bros., Ltd.,

39, Victoria Street, London, S.W. 1.

[Stand No. 4; Block 12. D.]

Messrs. Tilley Bros. have a full display of their specialities, among which may be mentioned the following: No. 0 Class A compressor belt drive, capacity 120 c.ft. per hour; No. 1 Class B with electric motor, capacity 250 c.ft. per hour; a range of gas flashers with signs suitable for showrooms, shop windows, &c., tinmen's stoves and soldering irons for high and low pressure gas, blow pipes for high pressure gas, the Hendon geyser, and Tilley eccentric elbows with wood blocks for fixing gas lighting fittings.

Timmis & Co.,

Stourbridge.

[Stand No. 3; Block 11. J.]

This firm are showing a new all-grog refractory, which is claimed to possess certain very definite characteristics which are desirable and which differ from the ordinary fireclay. It is regarded as a considerable step forward in refractory manufacture for the gas industry. Another feature is a complete range of cements for the gas industry. There are eighteen of these, covering every purpose. "Lava" bricks are also shown.

Torbay Paint Company, Ltd.

26-28, Billiter Street, London, E.C. 3.

[Stand No. 3; Block 12. B.]

This firm, whose business was established in 1846, are showing their well-known "Torbay" paint, which is specially prepared in all shades of colour for holders, purifiers, condensers, and general gas-works plant. The Company claim that it resists the effects of sulphuretted hydrogen, ammonia, &c., and is always of uniform standard quality. For street lamp columns, cookers, meters, and other purposes, scientifically processed paints and enamels are in general use. "Torbay" joint stopping is a non-poisonous plastic putty containing no lead compounds, for service joints and similar uses, to prevent gas leaks—superseding the employment of red and white lead. Convenience in use and avoidance of lead poisoning are among the advantages claimed.

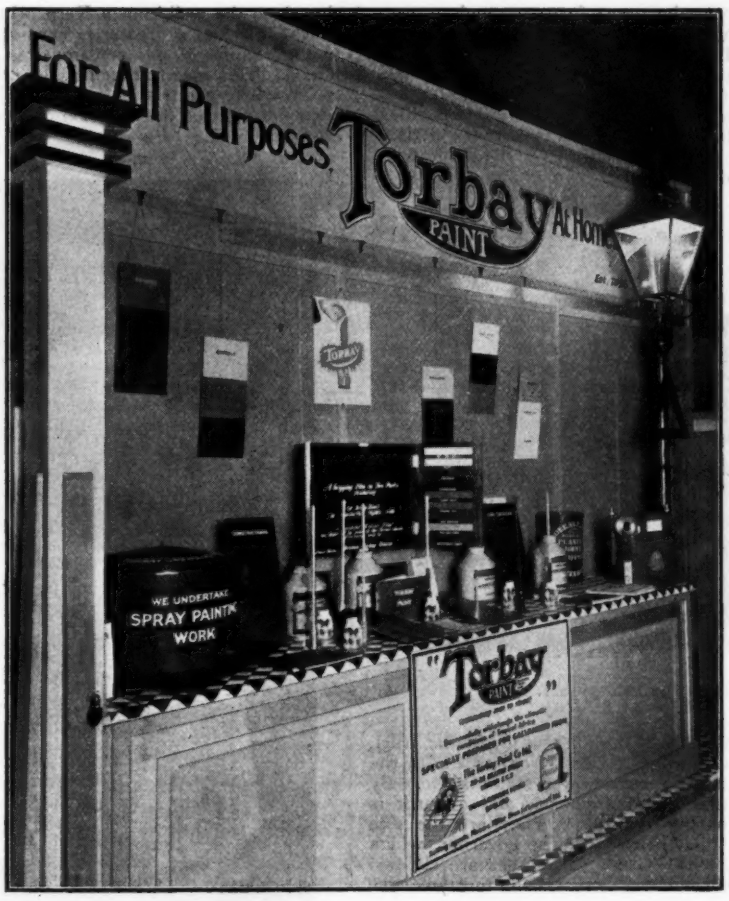
The Company possess valuable deposits of natural oxide of iron at Brixham (Torbay), Devon, where their works are situated.

C. & W. Walker, Ltd.,

Midland Iron Works, Donnington,
near Wellington, Shropshire.

[Stand No. 3; Block 11. L.]

There are included on the above stand a large number of models of gas-works plant, consisting of condensers, Milbourne



"PAINT OR PERISH."

discharge chutes, hydraulic main valves, Milbourne fasteners for purifier covers, purifying machine, Milbourne trinity valve, sulphate of ammonia still, Walker washer trough, retort mouthpieces, compound washer trough, Weck valve, Milbourne valve inside purifiers, eight-way centre valve, Milbourne duplex valve, Walker washers, and four-way centre valve. They also have full-sized hurdle and parallel bar flat grids, open top flat grids with round pegs, 2½ in. flat standard grids, and a taper device for horizontal washer scrubbers. In addition, the firm are showing a Milbourne roller carriage of steel throughout, having large bearing surfaces, and provided with self-lubricating axles, a speciality that has found great favour among gas engineers for spirally guided gasholders. There is also a full-sized section of the Milbourne-Beard indiarubber pad for purifier covers, which since its inception has found great favour, and is proving in actual practice to be a sound engineering proposition. The ease with which the old worn-out indiarubber pad can be removed, and a new one inserted, is demonstrated on the stand. They are exhibiting a mild steel tee with joints and flanges electrically welded; a portion of the tee being cut away to exhibit the soundness of the welds.

There are close upon fifty photographs illustrating plant they have recently erected in various parts of the country, comprising gasholders (among them being the 5 million c.ft. spiral holder at Bournemouth, and the 12½ million c.ft. guide framed holder at Sydney, N.S.W.), purifier installations (including those at Stoke and Bournemouth), welded steel mains, tar stills, cast-iron pipes and connections, washer scrubbers, Livesey washers, condensers, tanks, sulphate of ammonia stills, and saturators

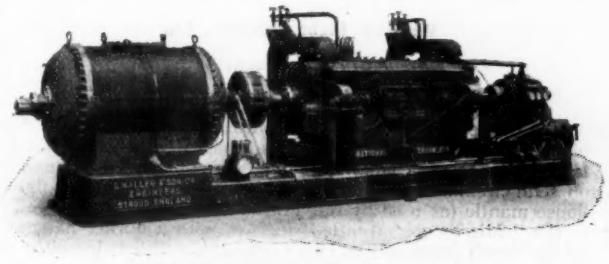
George Waller & Son, Ltd.,

Phœnix Iron Works, Stroud, Glos.

[Stand No. 2; Block 11. L.]

The firm are exhibiting a number of photographs illustrating their specialities in gas-works plant—including exhausting machinery, gas boosting and compressing plant, various types of pumps, the "Retriever" pan ash separating and coke breeze washing plant, hydraulic truck tippers, and Reeson retort house governors.

The Company have been established over a hundred years, and have specialized in exhausting machinery since the early days of gas supply. They claim to be the original patentees and makers of the four-blade rotary exhauster, which is now a recognized type, and in use on numberless gas-works. The firm make these exhausters in a wide range of sizes, for dealing with from 1000 to 500,000 c.ft. of gas per hour. Attention is drawn to steam turbo boosting fans for raising the pressure of gas throughout the district where required. These are specially-built enclosed fans, direct coupled to steam turbines; smaller boosting fans are arranged for gas engine drive through counter-shafting. There are illustrated various types of gas compressors: Rotary compressors, built on the lines of the four-blade exhauster for boosting purposes, or for transmission of gas through small mains, up to a discharge pressure of 5 lbs. per sq. in. These are also supplied over a wide range of sizes, and steam, gas engine, or electric drive. Reciprocating compressors for transmission at high pressure. The firm have a complete range of sizes, horizontal and vertical, single and duplex, usually arranged for steam tandem drive, either single or compound engines.

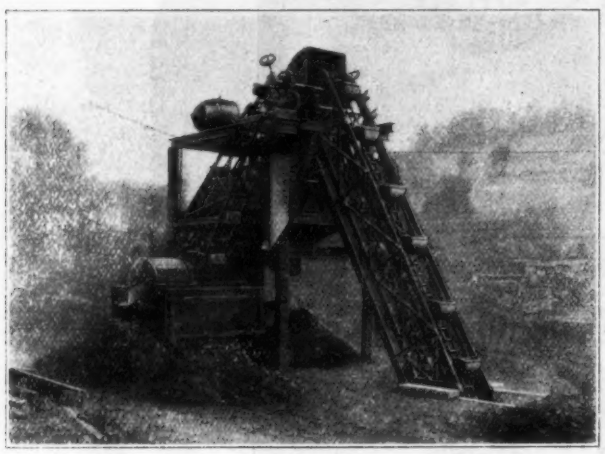


"Michell" Patent Crankless Compressor.

Messrs. Waller are the sole licensees in this country for the "Michell" patent crankless compressor, an entirely new development of highly efficient mechanical design. They show a descriptive sectional drawing of this machine, which is multi-cylinder, reciprocating, high speed, and totally enclosed, designed for dealing with any discharge pressures. Owing to the ingenious "Michell" design, it runs at high speed, about 750 R.P.M. in perfect balance. We illustrate here the "Michell" compressor for dealing with 500,000 c.ft. of gas per hour, with a discharge pressure of 7 lbs. per sq. in. direct coupled to a 300 B.H.P. "Michell" crankless gas engine. In connection with high-pressure boosting plant, the firm supply a complete range of district reducing governors.

Messrs. Waller are sole licensees in this country for the manufacture of the "Retriever" pan ash washer, which deals

with pan ash material from the retort furnaces, and recovers the coke, which usually varies from about 25 p.ct. to 45 p.ct. The dust is also recovered, and is marketable for concrete block work, while the clean washed clinker is suitable for road-making, &c. The " Retriever " machine is supplied, too, for producing clean washed coke (separating from this the impurities) for domestic boilers and industrial purposes. Samples of these separated materials are exhibited, with a sectional drawing illustrating the working of the plant.



"Retriever" Pan Ash Washer.

The firm have supplied a large number of hydraulic truck tippers for up-ending and discharging coal from trucks to the coal bunkers, for gas-works, electric power stations, &c. By the use of these, labour is greatly reduced, and a truck is emptied in from three to five minutes. They are the sole makers of the " Reeson " patent retort house governor, which is of the dry diaphragm type. Great advantages are claimed for this over the usual hydraulic water seal, bell, and tank type of governors.

Waterless Gasholder Company, Ltd.,

13, Rood Lane, London, E.C. 3.

[Stand No. 3; Block 12. C.]

The chief exhibit here is a true-to-scale model of a waterless gasholder, so arranged that the main constructional features—roof, piston, sealing trough, &c.—may be viewed, and the action of the piston demonstrated. In addition, there are displayed a number of detail drawings, and also photographs of waterless gasholders of various sizes completed and in different stages of progress. An article written by the Editor of " Specification," and appearing in the 1929 edition, treats the subject of the waterless holder from the æsthetic point of view more especially. The writer's opinions—in no way solicited or inspired—make interesting reading; and reprints of the article in question are obtainable at this stand.

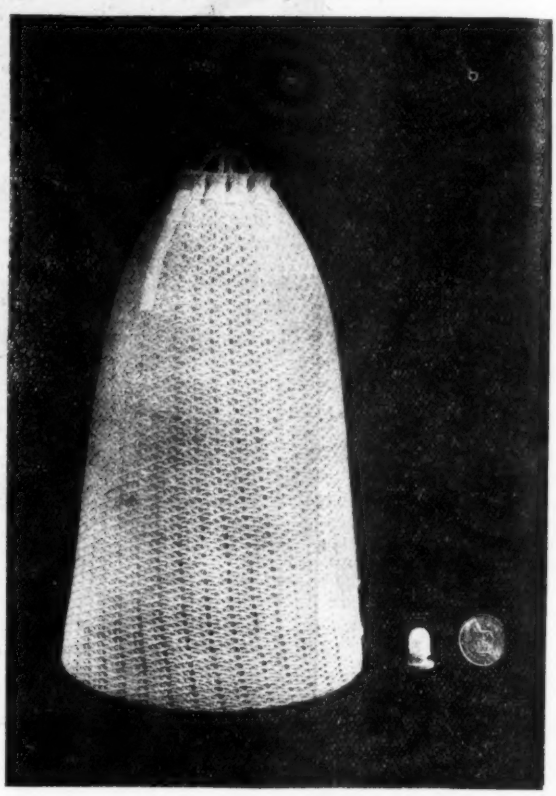
Welsbach Light Company, Ltd.,

King's Cross, London, W.C. 1.

[Stand No. 2; Block 12. G.]

The Company are again concentrating very largely on the display of gas mantles of all sizes, shapes, and forms manufactured by them. Samples of their various products exhibited on semi-circular tier stands range in size from the large lighthouse mantle (as used by the Trinity House Authorities) down to the " Microscopic Mantle " for use with a burner patented by the South Metropolitan Gas Company, which is intended to displace the old-time nightlight in bedrooms. Space does not admit of the display of all mantles manufactured by the Company, but those exhibited give a fair indication of their variety. There is also an excellent exhibit of an actual lighthouse burner in use in conjunction with two sectional reflector panels such as are employed in the lighthouses round our coast. These have been loaned by Messrs. Chance Bros., of Birmingham, who are the manufacturers and suppliers of this apparatus to the Trinity House Authorities. The panels project a beam of something like 78,000 British candles; and it will be realized how important is the question both of strength and of uniformity of size in the manufacture of mantles for this purpose.

The Company are also showing a comprehensive range of inverted burners both for public and domestic lighting, this being a rapidly developing branch of their business. The same remark applies to gas fittings, of which they display a limited but well selected range. There are also Kern radiators and " Handiheaters," both of which are fitted with a burner designed on the well-known Kern principle, the particular virtue of which is that a greater proportion of primary air in relation to the volume of gas consumed is absorbed and successfully mixed. This means that it is less dependent on secondary air for complete combustion, resulting in a largely increased efficiency as regards the emission of heat volume in relation to the gas consumed.



The Largest and the Smallest Welsbach Mantles, shown alongside a Sixpenny Piece.

Situated between this firm's stand and that of Lighting Trades, Ltd., is a working exhibit of the principal operations in the manufacture of gas mantles, which has been arranged jointly by the two Companies. These operations include knitting of ramie yarn, sewing and looping of upright mantles, fixing of rings to inverted mantles, strengthening of the vulnerable parts of both upright and inverted mantles, and burning-off and shaping of both types by means of high-pressure gas. It is, of course, not possible on an exhibition stand to demonstrate each of the many intricate operations involved in the manufacture of mantles; but visitors will obtain an accurate impression of the method of manufacture from the processes which are being carried out. In addition, there are on view samples of the raw materials and chemicals used in manufacture.

West's Gas Improvement Company, Ltd.,

Miles Platting, Manchester.

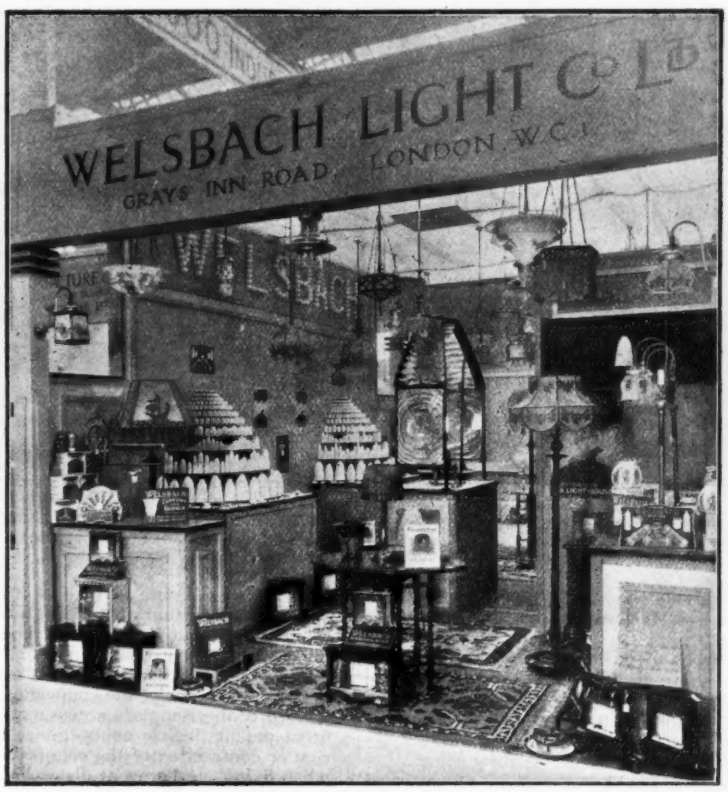
[Stand No. 4; Block 12. B.]

Much interest will be attracted to this stand by the exhibition of a complete working model, designed and built in the Company's Manchester works, of a typical installation of Glover-West continuous vertical retorts, equipped with an electrically-driven West lip-bucket conveyor, and embodying all the familiar features of the system. Every component part of the installation is a faithful and true-to-scale reproduction of its original; and the model actually demonstrates the action of all mechanical apparatus, even to the small but important ratchet and worm gear operating the extractor helix. It is possible to follow the passage of the " coal "—seed is used as a substitute—from the storage bunkers above the retort bench, through the coal-feed hopper and into the retort, and its discharge after " carbonization " into the lip-bucket conveyor which elevates and dumps it into the bunker again.

A full-size section of the newly-introduced West " Key " retort has been built, and is exhibited with the top course detachable, so that the key bond can be examined and the rigidity of the tie appreciated.

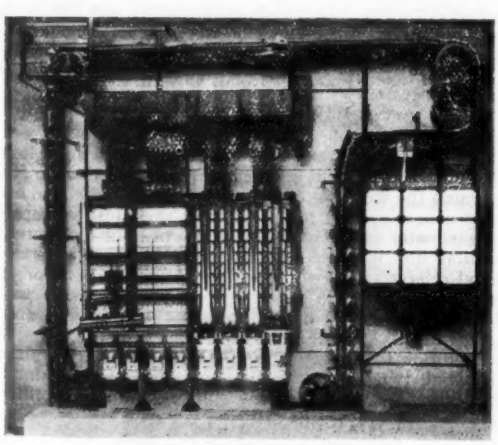
Specimens of refractory and insulating brick applicable to vertical and horizontal retorts and to kilns, ovens, furnaces, &c., are shown by the Derbyshire Silica Firebrick Co., Ltd.

On the same stand Messrs. West's Rotinoff Piling and Con-



SHOWING THE WELSBACH "LIGHTHOUSE."

struction Company exhibit a working model of their shell-piling apparatus. The observer can see perfect replicas of the West-Rotinoff semi-cylindrical concrete shell piles placed round the helical mandrel, driven section by section into sand, and the hollow pile filled and set exactly as in actual practice. In this instance also all working parts are accurately reproduced, and the action of the whole apparatus is a true demonstration of the original.



Model Glover-West Installation.

A wide range of photographs and diagrams illustrate the operation of plant of the types exhibited, in gas-works practice throughout the world.

Whessoe Foundry and Engineering Company, Ltd.,

Darlington and 25, Victoria Street, London, S.W. 1.

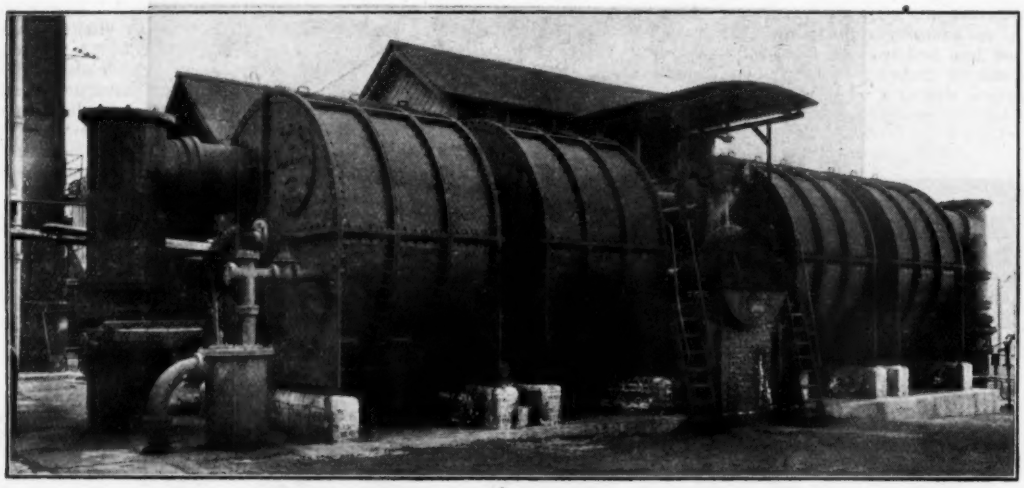
[Stand No. 1; Block 11. K.]

The Company's exhibit this year is of outstanding interest to the gas engineer on two main accounts. First, because a full-sized Whessoe washer-scrubber has been built on the stand; and, secondly, because of the striking reproductions of their newly-adopted "Hortonsphere."

The Whessoe Company apparently thought that, in preference to showing a model, an actual washer-scrubber would prove of interest in enabling those who have not had the opportunity of inspecting fully this Company's machine in actual use to go over its constructional details at the Fair. The machine exhibited is a Whessoe rotary washer-scrubber with a capacity of 2 million c.ft. per day for ammonia extraction, steam engine driven through sturdy worm gearing. Its constructional details are strikingly shown, as they are exposed by some of the segment plates being removed; while bearings, liquor connections, and fittings are all fully in view. The machine is typical of many that have achieved notable success in operation in this country and abroad. While apparently designed primarily for extraction and lasting use, we understand that, as far as ammonia liquor is concerned, these machines can work-up strengths to a high degree without any loss of efficiency. The machine shown is an actual order, and appears on the stand prior to despatch to Canada. It is a portion of a contract received from the Quebec Railway, Light, Heating, and Power Company, which also included two condensers, purifiers, Livesey washers, connections, valves, &c.

Elsewhere in this issue the use and construction of the "Hortonsphere"—the latest type of gasholder—is described. We can recommend a visit to this stand, where some striking colour drawings of the "Hortonsphere" are on view. The "Hortonsphere" has without doubt a future; and the main advantages of this type of gas storage are pointed out by the

57½ Ft. Diameter "Hortonsphere," which, at 50 lbs. per sq. in. pressure, would give a total working capacity of 340,000 c.ft.



5 MILLION C.FT. PER DAY WHESSOE WASHER SCRUBBER FOR THE EXTRACTION OF AMMONIA, ERECTED FOR THE GAS LIGHT AND COKE COMPANY'S KENSAL GREEN STATION.

Company. Longer transmission lines we can all see coming; and in this respect alone a " Hortonsphere " will be of great use.

Photographs of other types of gasholders and of the many specialities of the Company are also shown. They form a pictorial record of past work, and give the best possible indication of the Company's actual capabilities in manufacturing gas plant on the " heavy " side of the industry.

Willey & Co., Ltd.,

Exeter.

[Stand No. 3; Block 12. E.]

This firm are exhibiting a range of their latest development in high-capacity meters, the selection on view being from 50 c.ft. to 15,000 c.ft. per hour. They can, however, manufacture this type of ordinary dry meter up to far greater capacities. It is felt by them that the high-capacity meter is a boon to gas undertakings. One very important feature is minimized overall size, which enables them to be fitted where a lights or standard meter often could not be. This is particularly the case in modern buildings, where all available space has to be utilized. Visitors to the Fair will notice the very robust structure of these meters; and the glass-cased meters in actual operation, showing easily every motion, demonstrate the ease of working and efficiency.

15,000 C.Ft. High Capacity Meter.

In the larger types of high-capacity meters—*i.e.*, from 1800 c.ft. per hour upwards—there is fitted a novel feature in lubrication. Ball and roller bearings working in grease baths are used, and the principal working parts lubricated with oil supplied by a feed pump. This is claimed to be a great advance upon the old system of allowing meter mechanism to work indefinitely without lubrication. The system has been in use by the firm for several years now, and has proved very efficient. There is yet another advance in construction that must not be overlooked—namely, the connections of the larger types, where flanged connections are necessary. Messrs. Willey & Co. have fitted patent flexible connections, which allow for any expansion or contraction of the connections or their being out of line when fixing, and prevent distortion of the valve plate and leakage. Wear on the stuffing box is negligible.

Messrs. Willey & Co. are unable to show all their other manufactures—they make practically everything for modern gas-works use—but in examining the range of main cocks exhibited in section, one is struck with the very clean full bore. These full bore main cocks were introduced by the firm to meet a demand for a cock having unrestricted bore; and they are now made with a bore of the same diameter as the service pipe to which they are to be fitted. They have also introduced the full-bore type into cooker union cocks, gas fire taps, &c.

George Wilson Gas Meters, Ltd.,

Foleshill Road, Coventry.

[Stand No. 1; Block 12. C.]

There are a number of interesting items to be seen here: and the special features of the exhibit are shown in glass cases, which enable the observer to examine all mechanism and actually watch the working of the instruments. The firm are introducing a new system for preserving the most vulnerable part of a gas-meter—namely, the diaphragm—but the secret of this invention has not been disclosed. By the new preservative method referred to, we understand the whole interior of a gas meter can be treated, and thus be made to resist gas, acids, alkali, &c. Parts of meters preserved in this way are shown in glass bottles containing benzole, paraffin, &c.

In addition to the above items of special interest, the exhibit includes all types of gas meters, pressure and consumption recorders, hotel meters, " Certus " meters, and many other items.

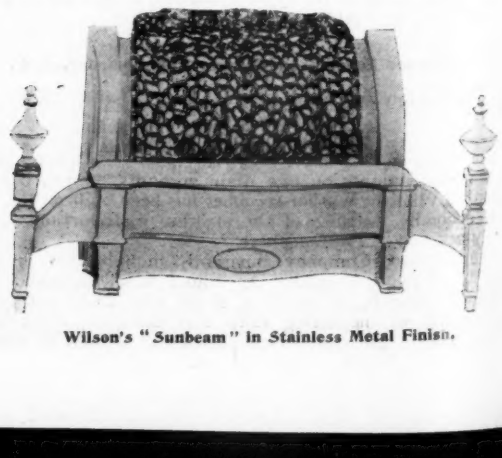
Wilsons & Mathiesons, Ltd.,

Carlton Works, Armley, Leeds.

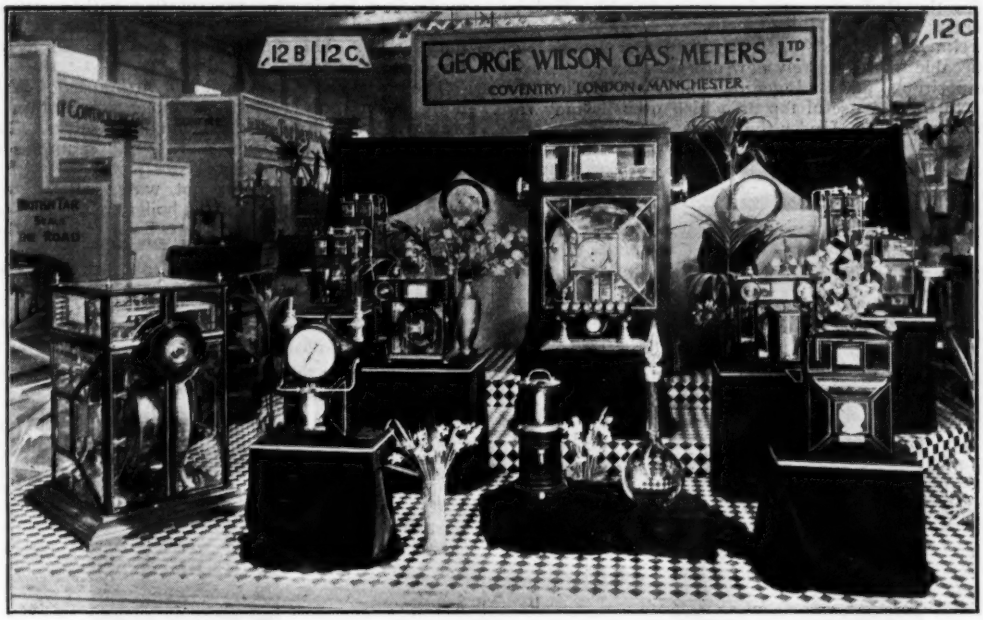
(Radiation Limited, Proprietors.)

[Stand No. 1; Blocks 11. F. and 11. G.]

Wilsons & Mathiesons, Ltd., are showing their popular " Sunbeam " gas fires in a special range of new " finishes," promi-



Wilson's " Sunbeam " in Stainless Metal Finish.



A FINE DISPLAY OF DEMONSTRATION METERS.

nent among which is the latest model in " stainless metal." This is an important development that has entailed much hard work and experiment. The finish is unique in its captivating " soft silver " effect, and is clearly much in demand. Prolonged tests under working conditions prove that this " stainless " finish is impervious to practically all forms of deterioration met with in ordinary service. The " York " gas fire has the ever-useful boiling burner concealed in the canopy, which is hinged to form a perfectly secure boiling hob when open. No difference from the ordinary gas fire canopy is noticed when this is closed-up.

The Wilson circulator is an ideal hot water outfit for general use, substantially made, and easily connected to the existing hot-water flow and return system. The gas supply can be controlled with the Wilson thermostat, if required. The circulator cylinder is on the same principle, but has its own storage, so that it can be used to supplement an existing supply that is inadequate, or to supply a complete self-contained hot-water

"Camden" Wash Boiler.

system. The " Camden " wash boiler is another Wilson product of advanced design that will appeal to controllers of housing schemes, &c. The inside of the pan is tinned copper, with a loose galvanized lid, and air clip, or with wooden or copper lid as required. The gas burner is highly efficient and economical, and the capacity of the pan is 10 gallons.

Woodall-Duckham Company,

Allington House, Victoria Street, London, S.W. 1.

[Stand No. 1; Block 11. H.]

The Company have decided to place their stand at the disposal of the gas engineers who are visiting the Fair, as a *rendezvous*, there being, otherwise, no provision in the Gas Section for a meeting place where engineers may congregate, apart from the gangways between the stands. The purpose of the stand is made clear by the inscription on the back, which states: " The Woodall-Duckham Company. At the Service of the Gas Industry." The stand is furnished as a writing room lounge, with comfortable chairs, tables, desks, writing materials, &c. Literature descriptive of the activities of the Company is available. The stand is in the charge of a technical representative, who will assist gas engineers on any matters which may be raised.

During the past few years, elaborate models of the Woodall-Duckham Company's plants have been shown at so many exhibitions that they are now well known to the gas industry. It is therefore felt that, by placing the stand at the disposal of visitors in the way indicated above, the Company will be on this occasion again fulfilling their aim—namely, " Service to the Gas Industry."

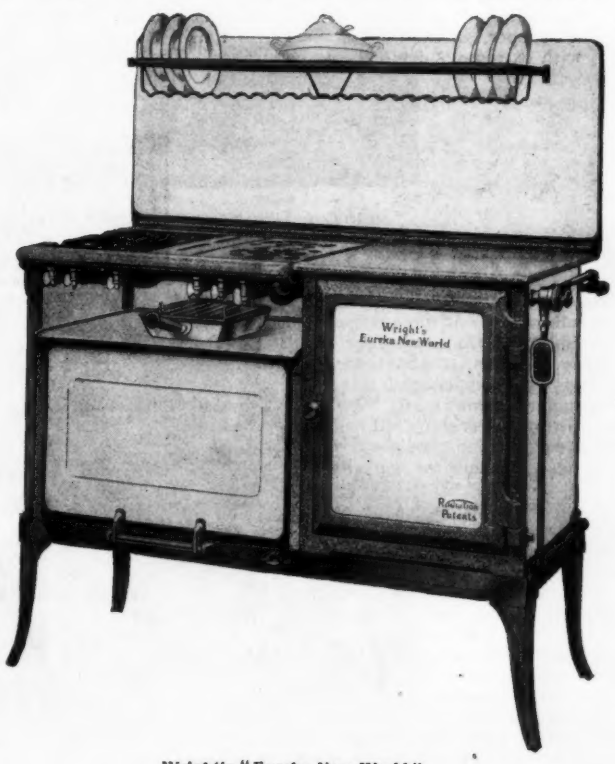
John Wright & Co.,

Essex Works, Aston, Birmingham.

(Radiation Limited, Proprietors.)

[Stand No. 1; Blocks 11. F. and 11. G.]

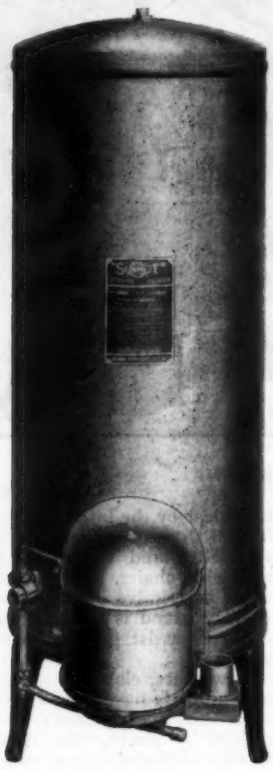
The giant organization centred at Essex Works, Birming-



Wright's "Eureka New World."

ham, provides the Radiation stand, as usual, with much of extreme interest.

The " Eureka New World " gas range of this firm is particularly noticeable for its entirely new presentation of the oven and hotplate positions, and its ingenious extension of the latter in one plane to form a useful top on which utensils may rest during temporary disuse. Under the hotplate there is an ample



The "Sunhot" Boiler.

and serviceable warming chamber, heated by its own " economy " burner. This range is entirely finished in " Rado " porcelain enamel. It is cleaned as easily as a dinner-plate, and will keep its brilliant flint-like surface for a lifetime of use.

Here are shown for the first time two fine new examples of the " Inigo " gas fire. One of these is finished in beautiful art copper, an example of " colour " finish combining delicacy with extreme " depth " and endurance. The other " Inigo " model is a fascinating presentation with every appearance of real oak; but it has hard-wearing qualities equal to any ordinary usage. This finish has been admired by all who have inspected it closely.

The remarkable gas consumption figures of Wright's " Sunhot " boiler (only 1¼ c.ft. per hour to maintain 20 gallons of water at 140° Fahr.) speak for themselves. The builder is well catered for by Essex Works, and examples are shown in the " Leighton " mantel register (complete with hearth), and the new builders' set for hot water supply, with insulated cylinder. The " Novo " wash boiler, with draw-off tap, is also of special interest. A departure from older methods is shown

The "St. Vincent" Radiator.

in the gas ironing set, which consists of a heater specially designed for economy, and irons constructed for quick heating-up and all-round usefulness. No tubing is therefore necessary, and this feature alone has made a host of friends for the use of gas for ironing.

All the gas fires exhibited on the stand have the new " Beam " radiants, about which so much has been heard since their introduction in October last. This improvement in gas fire heating has aroused much genuine interest. Scientists whose independent investigations have confirmed all claims made for these new radiants are enthusiastic about the benefits that must accrue from their general use. Visitors to the stand will have an opportunity of judging for themselves of the great step forward that has been made by the production of these radiants.

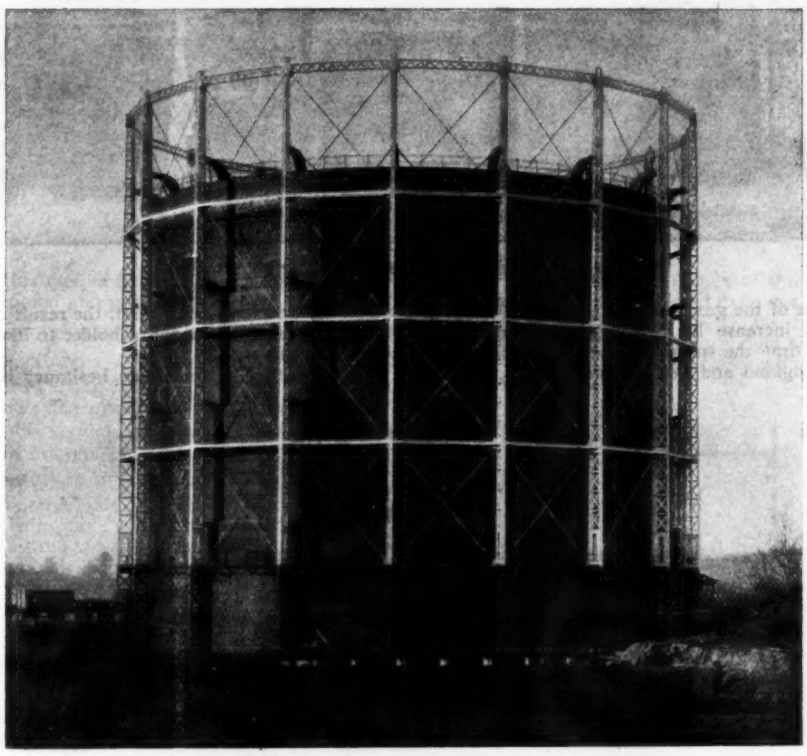
[Reference is made to a few of the general exhibits in the Fair on pp. 535 and 536.]

GASHOLDERS.

By R. J. MILBOURNE, Assoc.M.Inst.C.E.

Joint Gas Conference at the British Industries Fair, Birmingham, on Feb. 19.

The gasholder is one of the most important structures necessary for a gas-works, and it is not too much to say that the process of gas manufacture cannot be conducted on an economical basis unless ample and adequate storage accommodation is provided, as the manufacture of gas must be maintained at an approximately even rate throughout the 24 hours, while the rate of consumption varies considerably at different hours of the day. It is therefore necessary to store the gas during periods of minimum demand, and also to safeguard the supply against any temporary stoppage in the producing or purifying plant. A further important function of the holder is to ensure to the consumers a supply of gas having a uniform heating value in accordance with the requirements of the Gas Regulation Act of 1920; for in works where straight coal gas, blue water gas, and carburetted water gas are manufactured, the calorific value when delivered into the holder will vary considerably, and these various classes must have an opportunity of thoroughly mixing inside the holder before being liberated into the mains for consumption.



FOUR-LIFT TELESCOPE GUIDE-FRAMED GASHOLDER ERECTED AT OXFORD.

Reviewing the development of the gasholder from its inception to the present day, there are the following types from which the gas engineer may make a selection:

1. Guide-framed gasholders.
2. Spiral gasholders.
3. Spherical gasholders.
4. Tankless or waterless gasholders.

GUIDE-FRAMED HOLDERS.

The guide-framed gasholder has proved to be a very reliable structure, having been in use for over a century. In operation it is very simple and entirely automatic. There are no moving mechanical parts which necessitate daily attention; the only portion of the holder requiring inspection being the roller carriages, for the purpose of periodical lubrication. In case of accident (which is very unusual), since the entire structure is open to the atmosphere, there is not the smallest chance of explosion, as its contents would be dissipated into the open air, and not into a closed chamber. During the war many instances occurred where the contents of a guided gasholder were ignited and burnt out in quite a peaceful manner, without any explosive effect whatever.

There has been little scope for improvement in general design of this type of holder during the last thirty years; but the capacities have increased up to 12½ million c.ft., and, generally speaking, it is still considered the safest and most reliable known structure for gas storage. This latter point is of extreme importance, especially where a gas-works is situated in a thickly populated area. The most promising departure from ordinary construction was the introduction of reduced guide framing by the late Sir George Livesey. When this type of framing is adopted, it is usual to allow the inner lift (in the case of a three-lift holder) to rise above the top tier of girders when the holder is fully inflated; the guide channels being splayed at the top to ensure the top roller being guided into the channel run when the inner lift is either leaving or entering the guide framing. But experience has shown that the saving in material, and consequently the initial cost of the holder, is hardly commensurate with the disadvantages which accompany this particular type of construction. Apparently an appreciable saving of material is effected by the reduced length of standards, and the omission of one or more tiers of girders and diagonal bracing; but, as the reduced standard and top tier of girders must obviously be of greater sectional area than when the guide framing is carried the full height of the holder when completely inflated, the saving in weight of material is not so much as would appear by a casual glance at the holder.

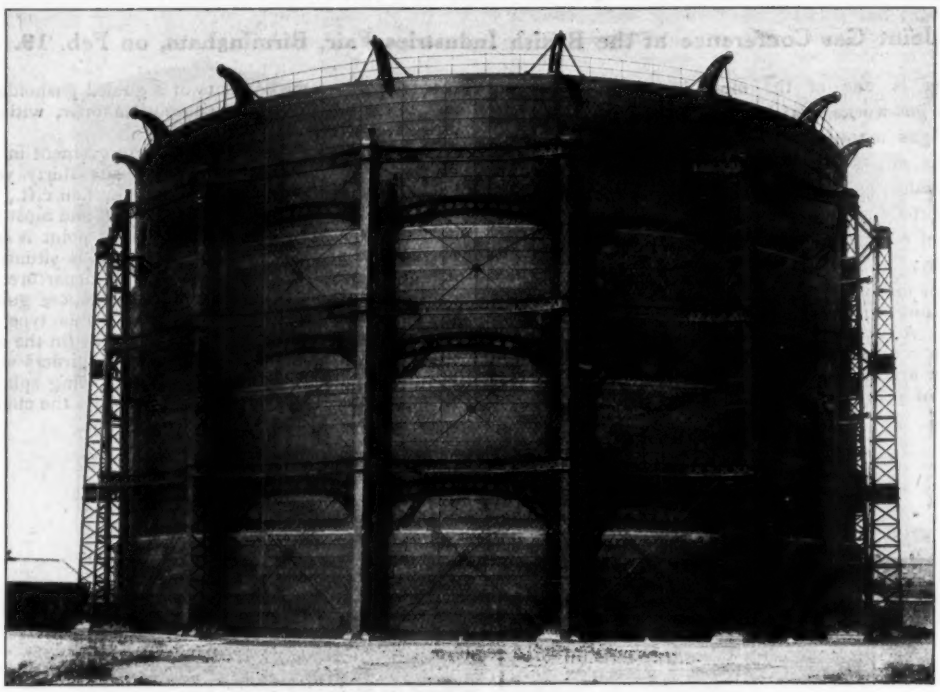
There is, however, a slight saving in the cost of re-painting the framing; but experience has shown that this form of construction considerably increases the wear and tear on the guide rollers, carriages, cups, and dips of the flying lift or lifts, and the rollers require more frequent adjustment and attention, to ensure their proper working, than with holders having the guide framing carried to the full height of all the lifts.

Many gasholders of medium capacities have been erected with guide framing constructed entirely of rolled joist sections, which system possesses many advantages. It reduces the cost of upkeep, facilitates painting, is less liable to corrosion, and is less costly than the usual guide framing of lattice-work construction. As it is now possible to obtain broad flanged steel beams up to 40 in. in depth and 12 in. in width, it seems desirable and

possible to design future holders of large capacities with rolled joist standards and girders.

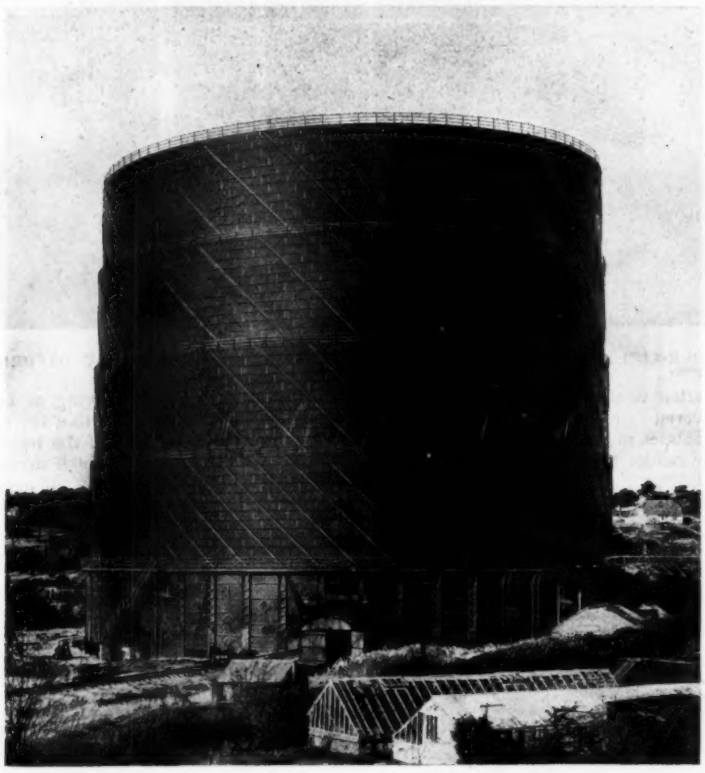
SPIRALLY GUIDED GASHOLDERS.

It is now over forty years since spiral gasholders were first introduced to the notice of the gas industry, and there has been a steady and gradual increase in the number erected; but, though at the present time the spirally guided gasholder is extensively adopted in England and her Colonies, it has not met with much favour abroad. The principle of spiral guiding is fundamentally sound, the gasholder being in effect a coarse-threaded screw with the spiral rails forming the threads, and the guide carriages (fixed to the grips and tank) constituting the nut. The action of the rising and falling gasholder bell thus follows exactly the action of a coarse-threaded screw leaving or entering a permanently fixed nut. Though the principle is sound, its application to such large and elastic structures as gasholders has required much practical research and demonstration; and its development, the result of many years' experience, has brought the spiral holder to its present state of efficiency and safety.



FLYING-LIFT GASHOLDER ERECTED AT WALLASEY.

There naturally was some hesitancy in dispensing with the elaborate guide framings hitherto considered necessary for large holders; but the reproach of slow progress should not be borne by the pioneers, who had not only to educate themselves in the various theoretical and practical problems involved, but were



FIVE-MILLION SPIRAL GASHOLDER ERECTED AT BOURNEMOUTH.

confronted with the equally difficult task of persuading gas engineers to depart from an already well tried and proved system of storage.

It is interesting to note that this type of holder in the first twenty years of its use was only adopted in medium size works; but its suitability for larger structures—within prescribed limits—gradually became evident, and spiral holders of from five to six million c.ft. capacity are now in satisfactory use.

A very effective method of stiffening the cups of a large spiral gasholder is by means of a horizontal girder, in accordance with the design of Prof. Karl Lohle, which was patented in 1912 (fig. 1). In this arrangement the hydraulic cup of each lift is stiffened by a horizontal inwardly extending girder. The web of this horizontal girder can be constructed with either a solid web plate or lattice bars.

The channel forming the bottom of the hydraulic cup is utilized to form the outer flange of this stiffening girder; and the inner flange may be curved to an arc of a circle, or it may be polygonal.

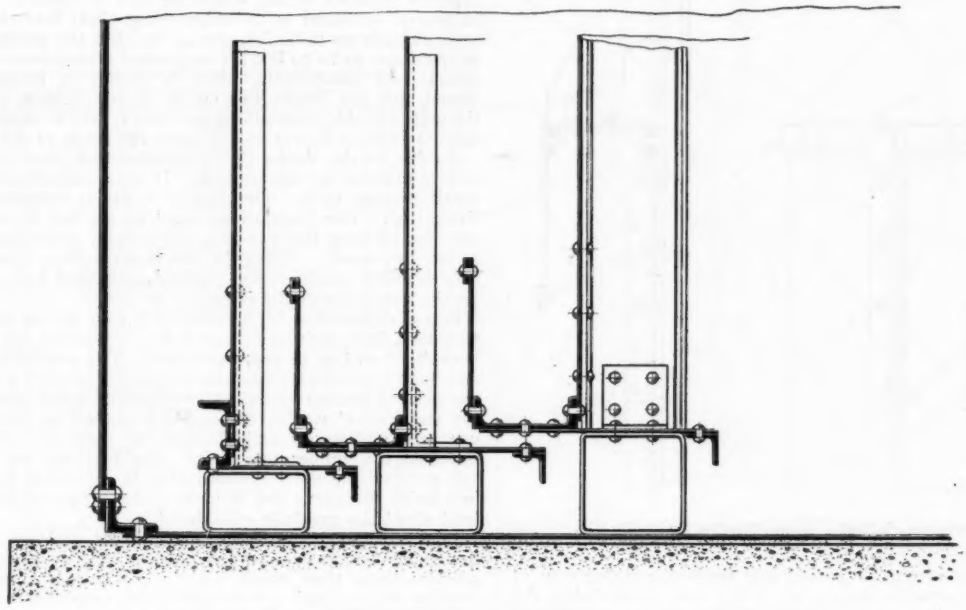


FIG. 1.—SHOWING METHOD OF STRENGTHENING THE HYDRAULIC CUPS AND BOTTOM CURB.

The advantages of this type of holder can be divided into two groups—viz., constructional and practical.

CONSTRUCTIONAL ADVANTAGES.

(*a*) Less capital expenditure.

(*b*) Capability of constructing holders of large diameter and small depth where the ground is unsuitable for holders of standard depth.

(*c*) Entire absence of internal guide rollers.

(*d*) A considerable saving in the time required to build.

(*e*) Economy in reconstructions. Three or four lifts can be erected in an existing tank containing a less number, thus largely increasing the storage capacity without extension of tank.

PRACTICAL ADVANTAGES.

(*a*) Impossibility of tilting under wind pressure and snow load.

(*b*) Greater delivering pressure due to the weight of the spiral guides attached to the floating lifts.

(*c*) Lower maintenance costs, due to the absence of external framing and upkeep in painting.

(*d*) Greater steadiness and reduced oscillation of pressure in high winds.

These advantages—especially the saving in initial cost, which may be taken as from 15 to 20 p.ct. less than for a guide framed holder—and the small expenditure in maintenance, have naturally caused the system to be extensively adopted.

There is practically no difference between the details of construction of a steel tank built to contain a spiral holder and one intended for a guide-framed holder; but it is desirable to provide a top curb of ample section, and stanchions immediately under the tank guide carriages, extending down to the base of the tank, so as to transfer directly on to the foundations of the tank the resolved strains due to these carriages. There should, however, be a substantial balcony round the top of the steel tank, to stiffen the structure and to provide a convenient pathway from which the guide rollers can be readily lubricated and inspected.

When spiral holders are constructed of large capacity—say, 6 million c.ft. and over—it becomes necessary to give increased lateral stiffness to the hydraulic cups, to ensure the retention of their correct circular form and for the prevention of distortion and undue deflection when the holder is fully inflated. This additional strength can be obtained in several ways. One suggestion is to introduce radial cup rollers running on internal guides; the cup roller carriages being set at an angle of 45° to suit the inclination of the internal guide rails. The internal guide rails would have to be fixed contra-wise to the external guides on the outside of the lift, and, of course, these inside guides would run in a reverse direction for adjacent lifts.

The top of the hydraulic grip should also be stiffened by bending the vertical stays and securely attaching them to the web of the channel (fig. 2).

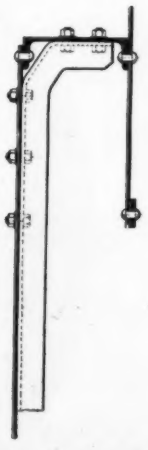


Fig. 2.—Showing Method of Strengthening Hydraulic Dip.

This ingenious method was first introduced by the late Mr. Samuel Cutler for a large guide-framed gasholder erected in the year 1908, and is now generally adopted, both at home and abroad, for giving rigidity to the grips of both spiral and guide-framed holders of large size. Another satisfactory method of attachment may be obtained by the addition of a bent angle or channel secured to each side flange of the vertical stay and to the underside of the hydraulic grip, thus giving a double attachment to the grip at each vertical stay, as shown in fig. 3.

The question of secondary stresses is of considerable importance in the design of spiral gasholders; and though it is impossible to eliminate these entirely, it is desirable to reduce them to a minimum.

One of the most important details is the top curb, which provides a good example of complicated stress systems; and in these circumstances it is necessary that care should be given to its design.

When the holder is inflated, the top curb is subject to two main forces—the pull of the crown sheeting due to the gas pres-

sure, and the weight of the holder bell, which counterbalances the vertical component of this pressure. These forces are held in equilibrium by the compressive resistance offered by the top curb. The design of the top curb of the holder should coincide with the stress vectors, if the secondary stresses are to be reduced to their lowest possible value.

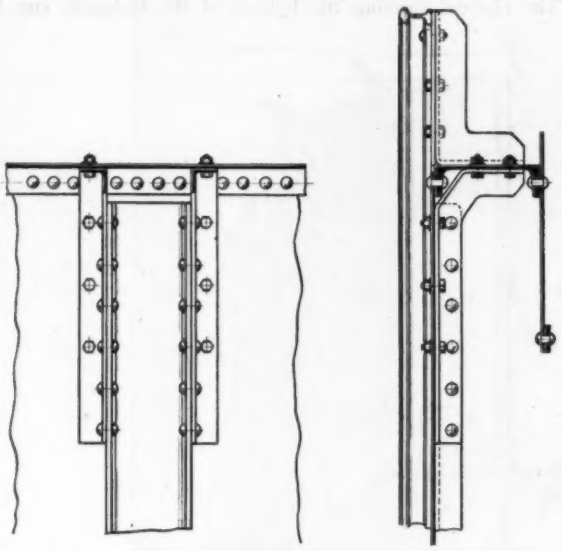


Fig. 3.—Showing Method of Strengthening Hydraulic Dip.

The first row of crown plating and the top hanging row of the side plates actually form part of the curb in resisting the compression strain, and therefore both the crown and the side plates in these cases should have planed edges and be butt jointed.

SPHERICAL GASHOLDERS.

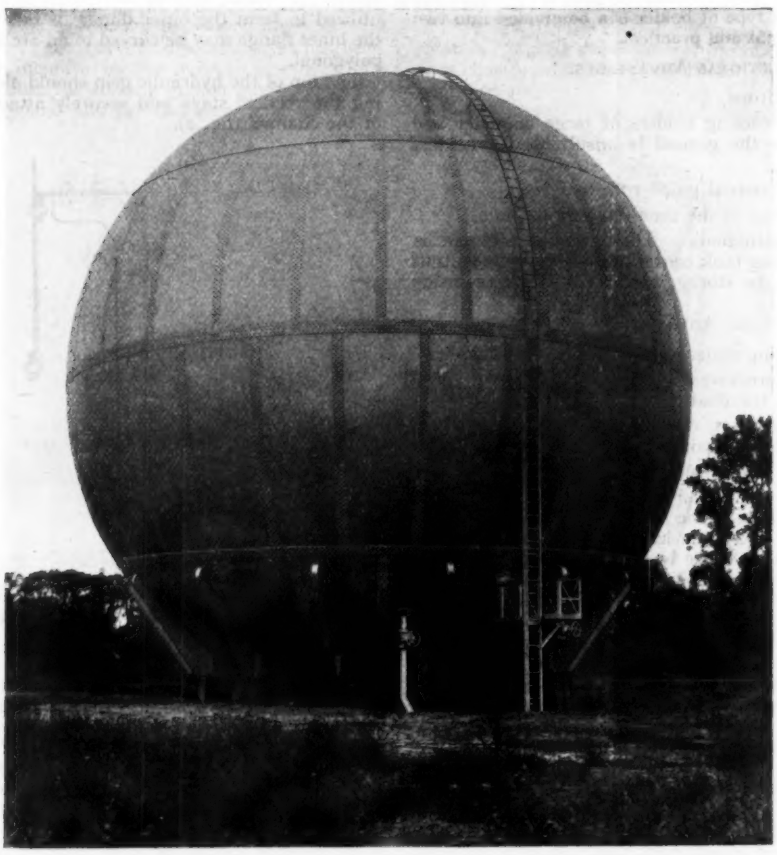
This type of holder is of American origin, and is now extensively used in the United States for the storage of natural gas and coal gas under pressure. We owe its introduction to Mr. George T. Horton, of the Chicago Bridge and Ironworks; and it is known as the "Hortonsphere."

It is a plain sphere of simple construction, usually 20 ft. to 60 ft. in diameter, made of steel plates of a thickness according to the pressure required. This particular shape was prompted, structurally, by being the natural shape for a pressure container. In it force is exerted directly against the shell uniformly at every point, and the resulting stresses on the side plates are less than for any other design, while it also has the greatest capacity of any shape per unit of surface. The gas to be stored is forced by a compressing plant into the sphere at any pressure up to 60 lbs. per sq. in., but the pressures usually adopted are 30 to 50 lbs. The general arrangement of Hortonsphere and compressing plant is shown on Drawing No. 1. When the gas leaves the outlet of the sphere, it is passed through suitable controlling governors, which reduce the pressure to such an extent as will meet the needs of the consumers.

As far as the holder itself is concerned, the Hortonsphere has a number of advantages. It is a simple and relatively small storage tank. The cost of a site is therefore comparatively low. The foundations required are not extensive or expensive, because there is only the weight of the steel structure to be supported. Piling is also unnecessary where soil has poor bearing qualities, for uneven settlement has no ill effects on the operation of the holder.

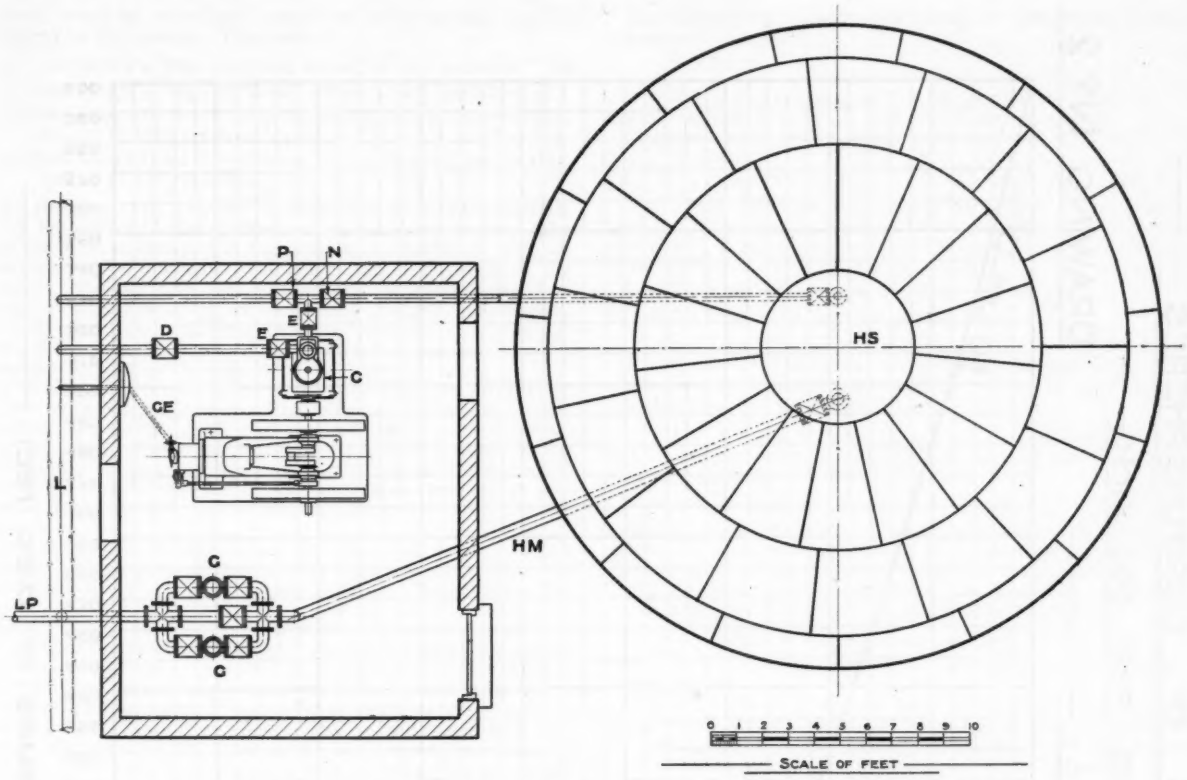
Gas distributed at high pressure is easy to use for industrial purposes, inasmuch as furnaces, &c., ordinarily are designed to burn it at 10 lbs. or more pressure. The possibility of taking gas from regular or transmission mains through a regulator at the desired pressure would eliminate individual compression at the consumers' works. It would be easier to get industry to use gas, and easier and cheaper for them to use after they installed the proper equipment. In Birmingham alone fully 33¼ p.ct. of the daily consumption is employed for trade and industrial purposes; and in view of these figures, the industrial load should be carefully considered.

High-pressure storage and distribution make it possible for gas undertakings to extend services to new developments much quicker than they could with a low-pressure system. The smaller mains, and consequent lower expenditure, enable the gas undertaking to show a return from a small number of consumers. At the same time, the additional consumption is desirable, and the early extension of the gas supply will doubtless develop a new district much more rapidly than it would otherwise do so.



HIGH-PRESSURE SPHERICAL GASHOLDER.

Hortonsphere maintenance costs are low. Installations are largely automatic, and do not require constant or even daily attendance. There are no operating parts to require attention,



DRAWING No. 1.—HORTONSPHERE: COMPRESSING AND STORING PLANT.

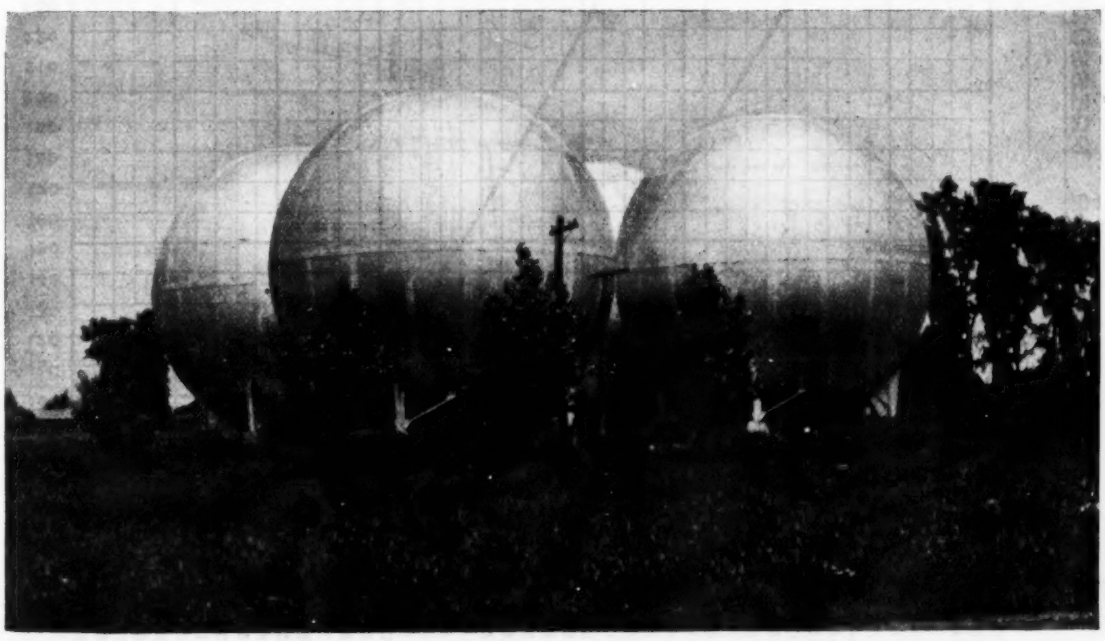
DESCRIPTION OF APPARATUS.

L.—Low-pressure main.
D.—Diaphragm cut-off valve to operate when pressure falls in low-pressure main.
E.—Isolating valves for compressor.
C.—Gas-engine driven gas compressor.
N.—Non-return valve.
P.—Pressure relief valve.
HS.—Hortonsphere.
HM.—High-pressure main to governors.
GG.—Pressure reducing governors with isolating valves and by-pass.
LP.—Connection to high-pressure or low-pressure distributing mains, as may be required.
GE.—Gas supply to engine.

or sealing water to be heated in cold climates. They are easy to paint, and they have less surface area than any other type of holder of similar size, and all the surface is accessible. A good grade of paint, well applied, will last a long time. Exposure to weather is the only action it must withstand.

The relatively small size of the Hortonsphere, its spherical shape, and the possibility of using light-coloured paints, all go to make it pleasing in appearance. This feature has greatly enlarged the possibilities of pressure storage, making it feasible to locate storage near the centre of the demand, even though it be in a residential district. Usually there is no objection to the installation of Hortonspheres by the general public or adjoining property owners.

Few Hortonsphere installations are connected up and operated in exactly the same manner. The specific conditions of each situation should be considered carefully by the engineering department, and the Hortonsphere connected up in the proper way to secure the desired effect. There are, however, four



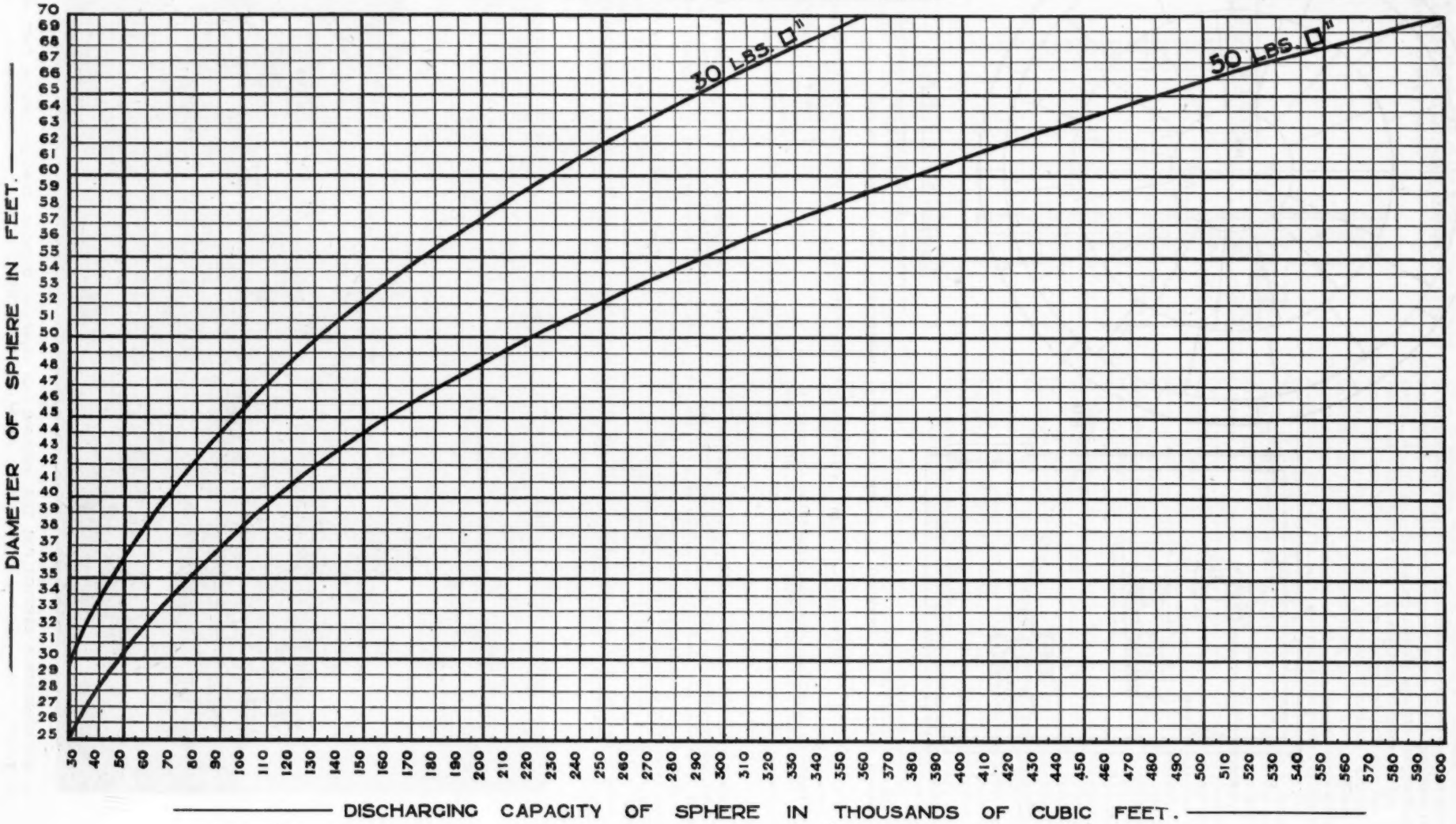
HORTONSPHERES ERECTED FOR THE WINDSOR GAS COMPANY, ONTARIO, STORING 1,000,000 C.FT. OF GAS AT 50 LBS. PRESSURE.

CHART SHOWING SIZES & CAPACITIES OF HORTONSPHERES

FOR PRESSURES OF 30 & 50 LBS. PER SQ. INCH.

BY R. J. MILBOURNE. ASSOC. M. INST. C. E.

DRAWING No. 2.



general ways in which gas enters the Hortonsphere and is returned to the system. They are:

(1) Gas enters at high pressure, let out at high pressure.
(2) Gas enters at high pressure, let out at low pressure.
(3) Gas enters from low-pressure mains through compressor, let out at high pressure.
(4) Gas enters from low-pressure mains through compressor, let out at low pressure.

In the first case, the Hortonsphere would be filled directly from high-pressure distribution or transmission mains. The gas would be compressed at the plant or a sub-station, with no compressor at the holder. The holder would be riding on the line, with the exception that the inlet and outlet pipes might be equipped with automatic valves to keep the gas from feeding into the distribution system until the pressure in it had decreased to a certain point. Customers using gas from such a system would do so through individual meters.

The Hortonspheres in an installation of type 2 would be filled in the same way as case 1. The outlet of the holder would, however, be equipped with a control valve which would permit the flow of gas from the holder only at the low pressure of the distribution system. In some cases the gas is distributed at five or ten pounds pressure through an intermediate system and turned into the distribution system proper, through district regulators.

In case 3, gas is taken from the mains of a low-pressure system, preferably at off-peak periods, and compressed into the Hortonsphere. Such a compressor would be located near the holder, but could be made automatic in operation, even to taking gas only at off-peak periods. An arrangement can also be installed so that the compressor could not pull a vacuum on the line at any time. Distribution at high pressure from such an installation would take place just the same as in case 1.

An installation exemplifying case 4 would be filled from a low-pressure distribution system and turned back into the system through regulator valves or an intermediate pressure system. This would be purely a case of using high-pressure storage with all low-pressure distribution.

The accompanying chart and diagram (Drawing No. 2) will readily give the diameter of sphere required for various capacities at pressures of 30 and 50 lbs. per sq. in. This chart has been derived from the following formula.

The atmospheric pressure, which is normally 14·7 lbs. per sq. in. absolute, has been taken at 15 lbs. per sq. in. in the following calculations. This approximation is sufficiently accurate for all practical purposes, and allows for the small pressure of gas (6 to 8 in. water gauge) which must necessarily remain in the sphere after discharging its contents into the service mains.

Let D = the diameter of the sphere in feet.
C = the discharging capacity in cubic feet.

Now the normal volume of the sphere (V) in terms of the diameter is given by the formula

$$V = 0{\cdot}5236\ D^3 \quad \ldots\ldots (1)$$

The discharging capacity of a sphere in terms of the normal volume will then be

$$C = PV/P_1 \quad \ldots\ldots (2)$$

where P = the gauge pressure in lbs. per sq. in. to which the gas is compressed and P_1 = the atmospheric pressure.

Then substituting $V = 0{\cdot}5236\ D^3$ in equation (2), the following is obtained:

$$C = 0{\cdot}5236\ D^3\ P/P_1 \quad \ldots\ldots (3)$$

The gauge pressure P to which the gas is compressed is usually 30 or 50 lbs. per sq. in. Therefore, writing in the values of P and P_1 in equation (3), the discharging capacity of a sphere under a pressure of 30 lbs. per sq. in. is:

$$C = 1{\cdot}047\ D^3 \quad \ldots\ldots (4)$$

and under a pressure of 50 lbs. per sq. in. is:

$$C = 1{\cdot}745\ D^3 \quad \ldots\ldots (5)$$

The diameter of a sphere when the discharging capacity is given and the gauge pressure is 50 lbs. per sq. in. may then be obtained from the following:

$$D = \sqrt[3]{0{\cdot}573\ C} \quad \ldots\ldots (6)$$

and for a gauge pressure of 30 lbs. per sq. in., the diameter of the sphere is then

$$D = \sqrt[3]{0{\cdot}955\ C} \quad \ldots\ldots (7)$$

The accompanying chart has been prepared from values obtained by the above formula, and gives the diameter of spheres required for any capacity from 30,000 c.ft. to 600,000 c.ft.

If a sphere is partially exhausted, the remaining quantity of gas that may be discharged, C_1, is found as follows:

$$C_1 = 0{\cdot}0349\ D^3P_2 \quad \ldots\ldots (8)$$

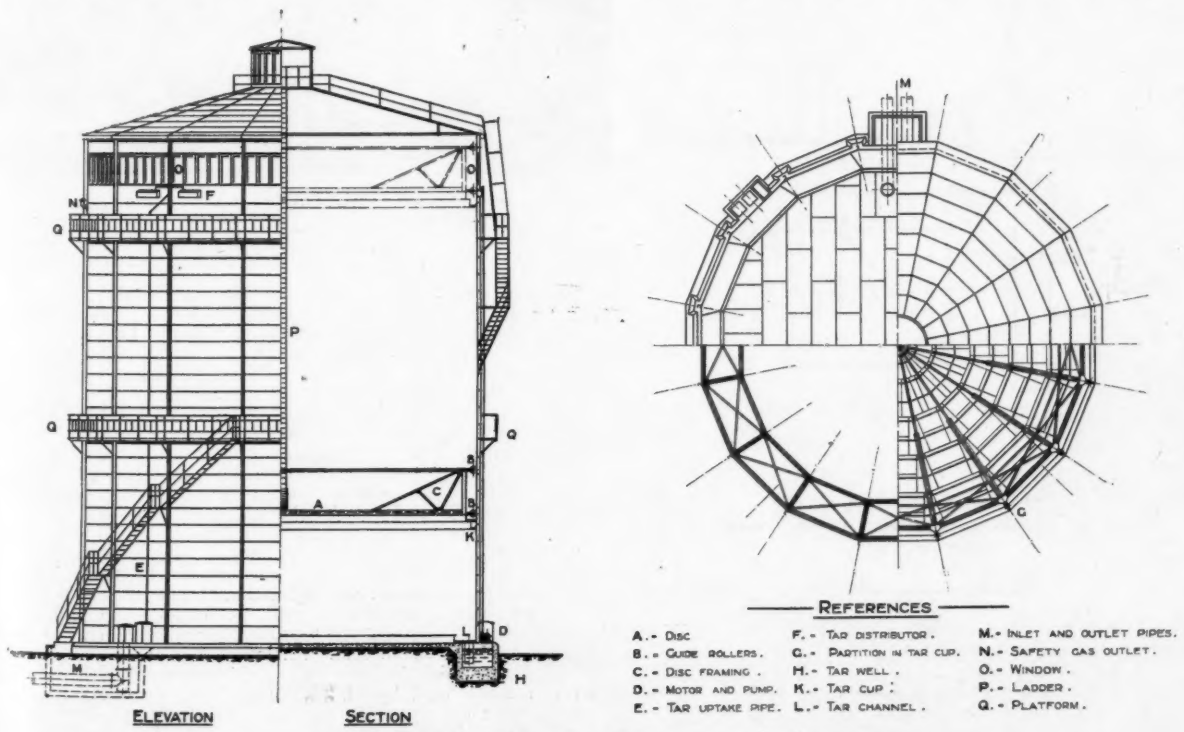
where P_2 = the gauge pressure of the gas in the partially exhausted sphere.

It is interesting to note that three well-known English firms of gasholder builders have been appointed as representatives of the Chicago Bridge and Ironworks for the manufacture and erection of the spheres in the British Isles and Colonies.

TANKLESS GASHOLDERS.

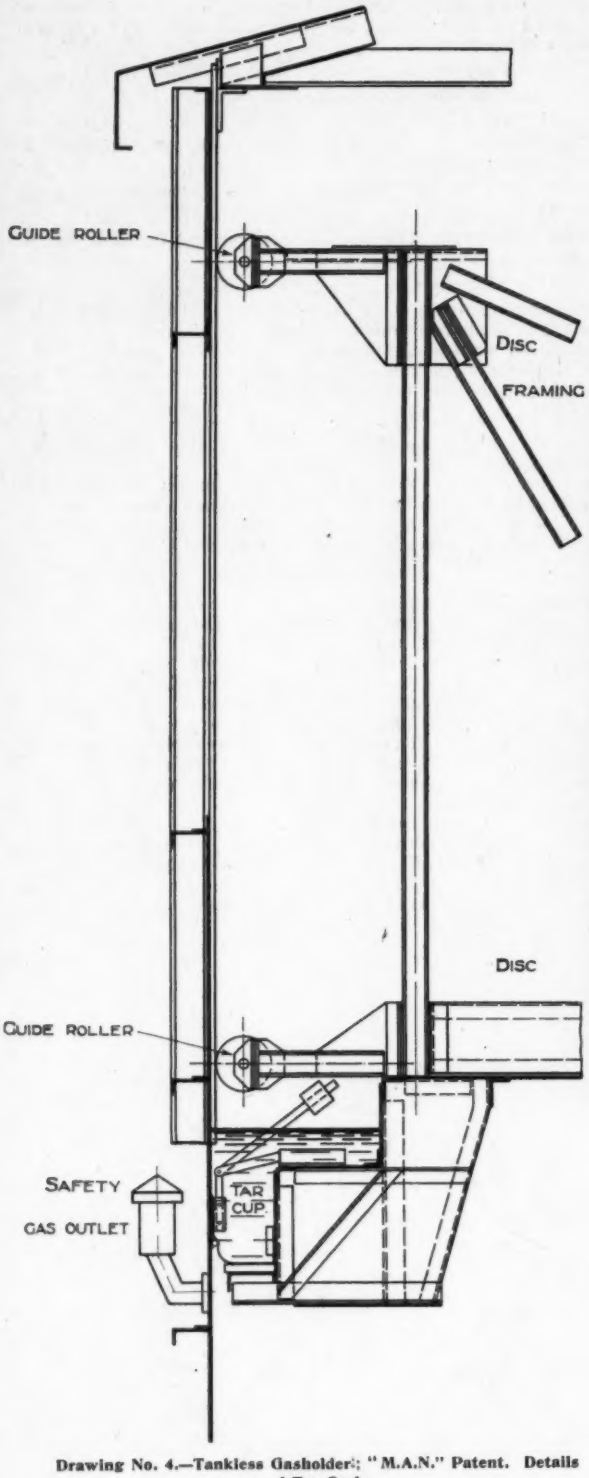
From an historical point of view, the idea of doing away with the gasholder tank, and of constructing the holder as an external cylinder closed at the bottom and fitted with a movable piston, is far from being new. Clegg (who was a pupil of Murdoch) built a collapsing holder in order to avoid the necessity of a deep water tank; and during succeeding years Nicholson, Cole, Knapton, and others, in the early days of the gas industry, obtained letters patent for various designs of tankless gasholders. The difficulty of making the piston perfectly gas-tight, however, appeared completely to baffle the ingenuity of these early designers.

In the year 1908, the firm Aug. Klönne, of Dortmund, invented a gasholder without any water seal, which was described in a paper read by J. Baudin at the Dutch Gas Engineers annual meeting in Brussels in July, 1910. None of these proposals, however, was considered in any practical form, or deemed suffi-



DRAWING No. 3.—TANKLESS GASHOLDER; "M.A.N." PATENT.

ciently reliable to be adopted until the Maschinenfabrik Augsburg-Nuremburg produced a workable solution of the problem in the year 1914, by using tar as the sealing medium between the movable piston and the sides of the gas container. This was followed at a later day by Messrs. Klönne, of Dortmund, who designed and patented an entirely new type of construction in which the tar and canvas seal with its attendant electric pumps was dispensed with, wherein the movable piston was rendered gas-tight by an ingenious system of rubber insertion



Drawing No. 4.—Tankless Gasholders: "M.A.N." Patent. Details of Tar Seal.

packing rings fitted with grease lubricators, to reduce friction to the minimum.

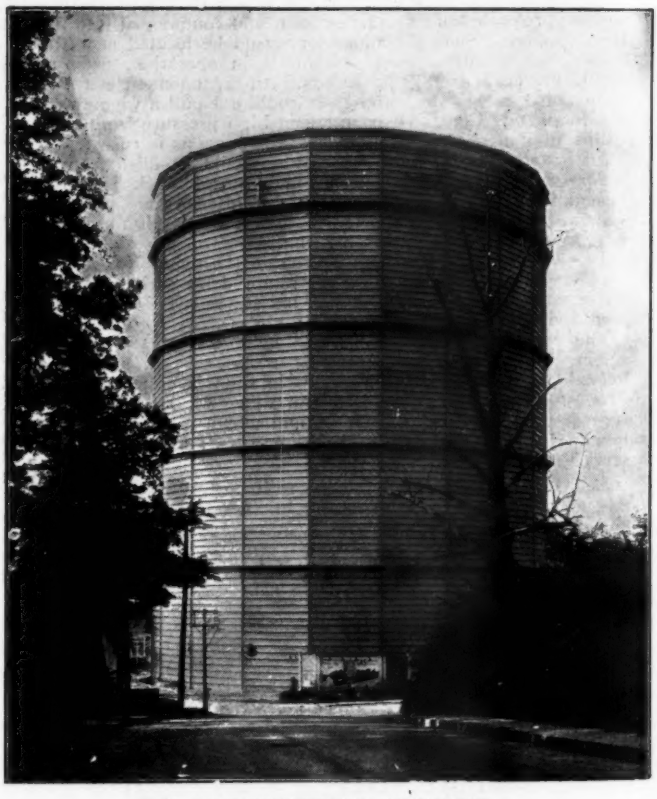
The chief advantages claimed for these types of tankless holder are as follows:

(1) Reduced cost of foundations.
(2) Reduced total pressure on subsoil.
(3) Constant uniform pressure.
(4) Dry gas.
(5) Reduced initial cost.

The "M.A.N." type has already been fully described in a paper by M. L. Rolland d'Estape, read before the Institution of Gas Engineers in June, 1925 (see "JOURNAL" for June 17, 1925, p. 911), and also in Mr. Frank Prentice's Presidential Address to the Eastern Counties Gas Managers' Association in 1927 (see "JOURNAL" for May 11, 1927, p. 365), and in a further short paper read by him at the Institution of Civil Engineers in June, 1928 (see "JOURNAL" for June 13, 1928, p. 720); and as there are several of these holders already erected and at work in England, I need only give a brief outline of this type of waterless holder. Diagrams and drawings (Drawings Nos. 3 and 4) have been reproduced in this paper for handy reference and comparison.

The "M.A.N." waterless holder consists of a polygonal shell provided with a conical roof. In this shell, a movable piston (shown in detail on Drawing No. 4) is fitted, supporting at its outer edge a ring cup containing the tar used for preserving the seal, and thus preventing the escape of gas.

The outside sliding plate, which is connected with the movable piston by a sail-cloth fabric, thus forming the cup or lute, is pressed against the wall of the shell by a system of cranked levers and counter-weights; the actual seal being maintained by the depth of tar in the lute formed by the sail-cloth and sliding plate. The depth of the tar should substantially balance



"M.A.N." WATERLESS GASHOLDER.

double the maximum pressure per sq. in. produced by the movable piston.

The tar is pumped to the upper edges of the shell by means of electric pumps, flows down the side plates, and fills up the lute cup to a predetermined height. The small quantity of tar which leaks through the space between the sliding plate of lute and the side plates of shell trickles down the side plates to the bottom of the holder, where it is collected in suitable tanks so arranged that, when a certain level is reached, the electric pumps automatically commence to pump the tar again to the top of the shell, and thus preserve the predetermined depth of seal. Though this small quantity of tar passes downwards between the periphery of the piston and the sides of the holder, there is no escape of gas, as the tar seal is maintained at a head superior to the pressure of the gas.

In the tar sealed piston it is important that the tar should not be diluted with water, and difficulty appears to have been experienced due to water condensing out of the gas and diluting the tar in the sumps at the base of the holder from which it is pumped to the piston seal. An interesting paper on this subject, dealing with the means adopted in overcoming the trouble, was recently read by M. Bazille at the French Annual Gas Congress and reported in the "JOURNAL" for Aug. 1, 1928.

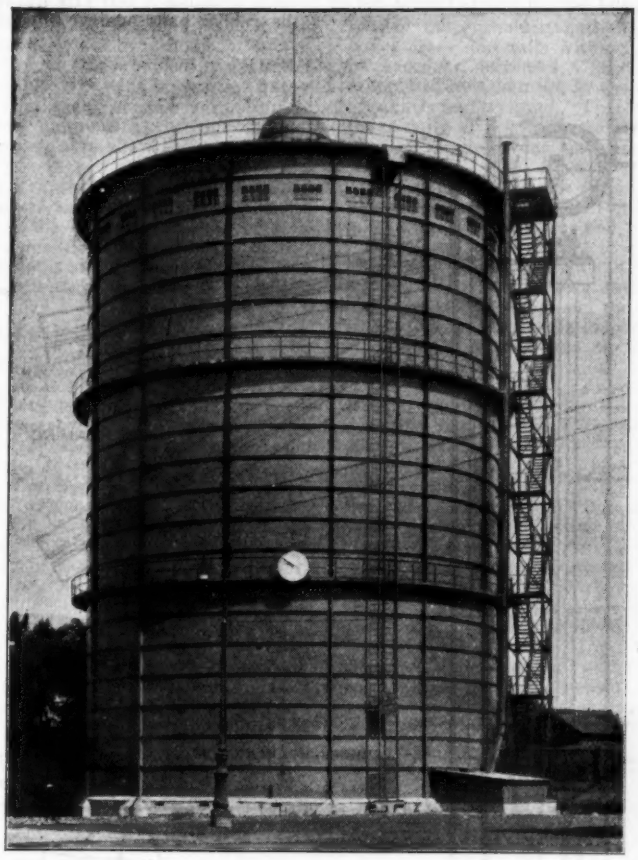
The shell is constructed to withstand wind pressure and ensure flatness by the external flanging of the well annealed soft

side plates, by vertical uprights to which the side plates are attached, and a series of platforms.

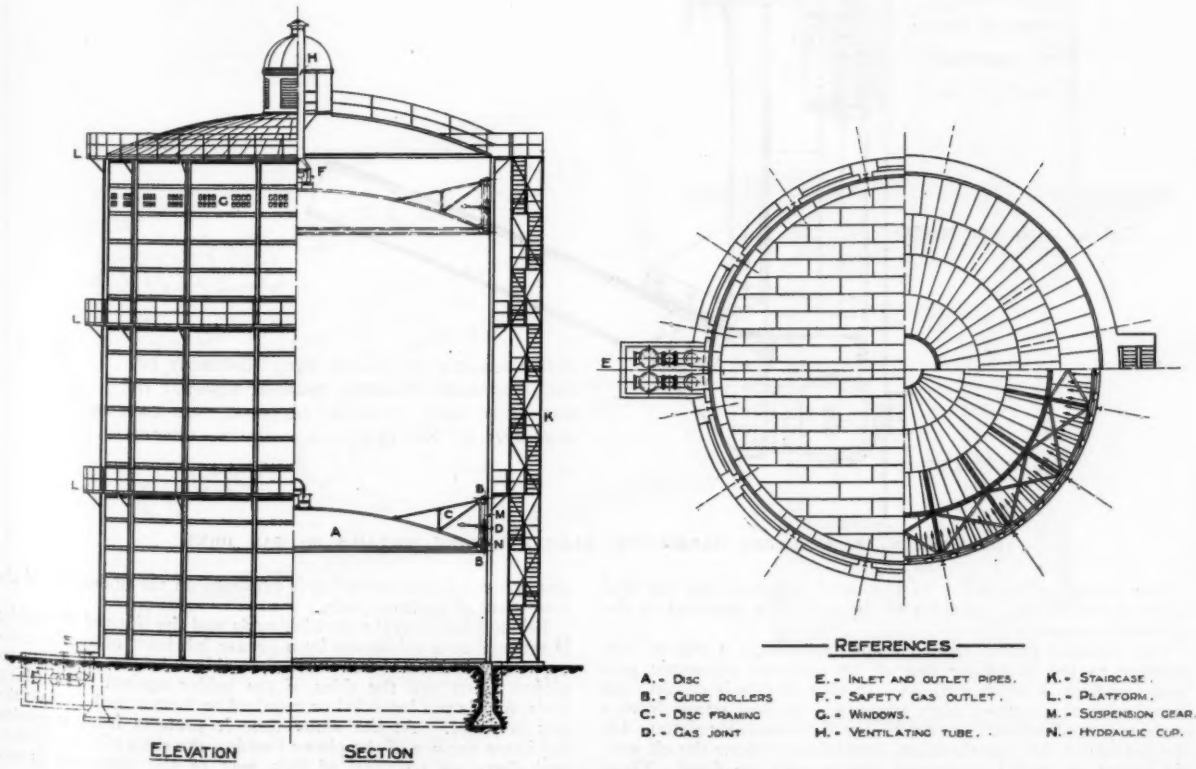
KLONNE TANKLESS HOLDER.

Though this type of holder has been extensively adopted abroad, we have not yet an example in this country; and I therefore purpose giving a full description of its construction and working.

This holder, which is shown on Drawing No. 5, is circular in form. The side plates are curved to the required radius, and riveted on their vertical edge to the upright stanchions, while the horizontal joints of these plates are covered by the outside horizontal channels, which add strength and rigidity to the shell and also form the butt straps for the horizontal riveted joints. The shell, being circular, and having all joints butted, presents a continuous cylinder for the contact of the piston,



KLÖNNE DRY GASHOLDER.



DRAWING No. 5.—TANKLESS GASHOLDER: KLONNE PATENT.

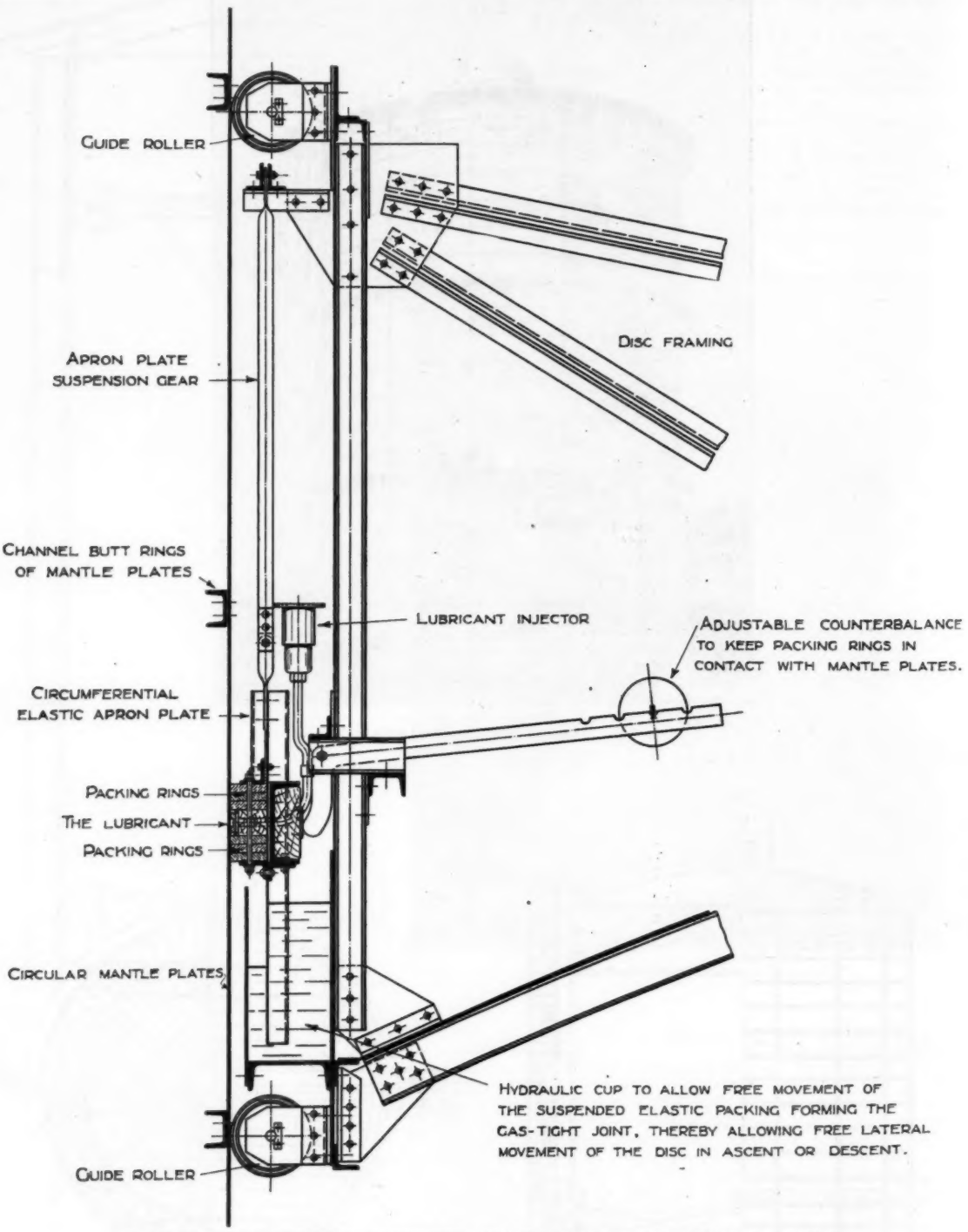
and has no spaces due to bends or joints in which small quantities of gas can accumulate during the descent of the piston, and pass from below the piston to the space above it.

Continuous circumferential platforms are provided at suitable heights, and the shell is covered in by a domed roof, which combine to make the structure inherently strong against distortion in all directions.

Inside the shell, or gasholder, there is a movable piston (shown in detail on Drawing No. 6) which is maintained perfectly level by a system of top and bottom rollers turned out of well-seasoned elm.

of cranked levers and counter-weights. The rubber pads are fitted with a system of automatic lubricators, which only require replenishing at long intervals.

It will readily be seen that the oil lute and curtain plate allow the necessary flexibility between the moving piston and the shell of the holder. Both the oil level in the cup and the lubrication of the packing pads can be inspected and attended to from the top of the piston while the holder is in action. The elasticity of the reinforced rubber packing pads can be relied upon to make a perfectly gas-tight joint. In order to protect the rubber pads against any injurious influence of the stored


GUIDE ROLLER
DISC FRAMING
APRON PLATE SUSPENSION GEAR
CHANNEL BUTT RINGS OF MANTLE PLATES
LUBRICANT INJECTOR
ADJUSTABLE COUNTERBALANCE TO KEEP PACKING RINGS IN CONTACT WITH MANTLE PLATES.
CIRCUMFERENTIAL ELASTIC APRON PLATE
PACKING RINGS
THE LUBRICANT
PACKING RINGS
CIRCULAR MANTLE PLATES
HYDRAULIC CUP TO ALLOW FREE MOVEMENT OF THE SUSPENDED ELASTIC PACKING FORMING THE GAS-TIGHT JOINT, THEREBY ALLOWING FREE LATERAL MOVEMENT OF THE DISC IN ASCENT OR DESCENT.
GUIDE ROLLER

DRAWING No. 6.—TANKLESS GASHOLDER: KLÖNNE PATENT. DETAILS OF GAS JOINT.

The necessary flexibility of the moving piston and the seal between the piston and sides of the holder is obtained in the following manner:

The movable piston carries at its outer edge a cup or lute (similar to the hydraulic cup of an ordinary telescopic gasholder) which is filled with oil. In this oil cup is dipping the lower edge of a curtain plate suspended by steel straps from a position just underneath the top rollers of the movable piston. On the outside of this curtain plate, immediately above the oil seal, six layers of special reinforced rubber pads are fixed. These pads are firmly pressed against the shell of the holder by means

gas, a special leather facing is provided on the underside of the lowest set of packing pads.

Friction between the packing pads and the sides of the holder is reduced to a minimum by a grease lubricant of special composition. It should be noted that this lubricant is only employed to smooth the sides of the holder against the packing pads, and is not intended or required to form a seal against the gas pressure. At the same time it protects from corrosion the inner surface of the plates forming the sides of the cylinder, and therefore painting of this part of the structure is unnecessary.

The dome shaped roof is provided in the centre with a ventilating turret and doorway, through which access to the interior of the holder and top of the piston is obtained; so that the seal and upper guide rollers can be readily inspected at any time, without interference to the working of the gasholder, above the gas level. Windows and louvres are provided immediately under the eaves of the roof, to admit light and for ventilation purposes.

Suitable staircases are provided from the ground line to the doorway on the lantern in the centre of the roof; and access to the top of the movable piston is obtained at any level by means of a lift worked either by a hand-winch or by a motor.

An indicator with a round dial face is provided at a suitable level about the ground line, which shows the amount of gas in the holder at any time. In the event of gas continuing to enter the holder when the piston has reached the highest point of its travel, a safety valve is arranged to allow the excess of gas to escape into the open air.

The foundations consist of a ring of reinforced concrete, in which the holding-down bolts of the vertical stanchions are strongly built. The bottom of the holder is formed of steel plates, which are laid upon a thin flat concrete bed. As this type of holder is entirely automatic in its action, the working expenses of supervision and maintenance are reduced to a minimum.

General.

All tankless gasholders must be considered as accurately designed machines, and be treated as such. They must receive attention at necessarily short intervals. Machines become more sensitive as their dimensions increase; and it is therefore very important that tankless holders, irrespective of the type, should be subjected to a daily inspection, to ensure safety of working. The extra care and expenditure on supervision must be placed against the lower fixed charges of this type of holder; and before leaving this subject, it may be interesting to record the arrangements which an American Company has made for the daily inspection of the working of the piston of the waterless type of gasholder erected at the Oakland Gas-Works. This holder has a capacity of 10 million c.ft.; being 218 ft. in diameter and 301 ft. high. An electrically driven lift, capable of carrying four passengers, is installed within the holder, and enables the top of the piston to be reached with ease and comfort. A suitable motor for operating this lift is erected in a steel house on the roof of the holder. Whenever a workman or inspector wishes to reach the top of the piston, he enters the motor house, operates a switch, and proceeds along a hatchway provided on the top of the gasholder roof. He passes into a penthouse, and descends a series of metal stairs leading directly into the passenger cage. On entering the cage and closing the door, he presses a button which starts the motor; and the cage is lowered to the top of the piston, thus giving quick and safe access thereto. Three special telephones have been installed to enable the passenger in the lift to keep in communication with the operator of the compressor station. One telephone is installed at the compressor station operator's desk, one on the roof of the gasholder, and the third on the top of the piston, which rises and falls within the holder as the volume of gas increases or decreases. The slack in the telephone cable is automatically taken up, as the piston rises and falls, by a series of pulleys and weights. This lift is used by an operator several times daily in descending to the top of the piston for the purpose of checking the tar seal, and for inspecting the radial rollers.

It is doubtful whether the initial cost of a tankless holder of a capacity under 1½ million c.ft. is sufficiently below a spirally guided, or even guide-framed, holder, to warrant its adoption.

Whenever it is intended to make provision for the extension of a tankless gasholder in the future, it is necessary to provide a foundation and holding-down bolts in the first instance of sufficient strength to resist the increased load these details will have to carry, due to the increased dead weight of the extended structure, and the extra surface exposed to the overturning moment of wind pressure.

The strength, stability, and safety in working of this new type of holder are points of extreme importance on which attention must be concentrated; and the gas industry owes a debt of gratitude to those engineers who have installed examples in this country. They can be relied upon to give the industry the benefit of their actual working experience in due time, and to say whether it is as economical in maintenance, as easily controlled in action, and possesses advantages which enable them to recommend its general adoption.

The interest aroused during the last few years in tankless gasholder design and construction is keen enough to warrant a belief among those who are studying the matter theoretically and practically that the development and improvement of this type of holder are far from having reached their maxima. Doubtless the design will still further develop; and this class of holder may eventually win the same degree of security and confidence in working that has characterized the guide-framed or spiral holder over a long period of time.

By Appointment.

CARRON GAS COOKERS

are the result of extensive practical experience, coupled with the finest materials and most modern ideas.

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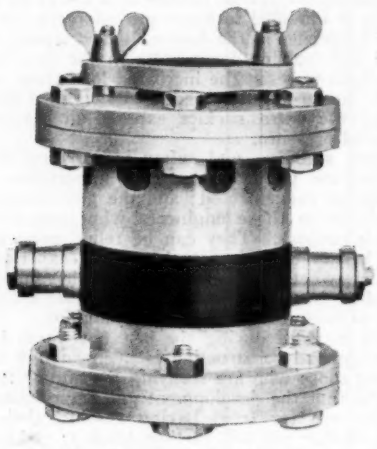
RINGROSE "GAS SENTINEL."

Device for Preventing Underground Explosions.

Prevention is better than cure; and there is no question that a device for preventing underground explosions of gas—whether coal gas, bitumen gas from old electric cables, or sewer gas—will be welcomed by the gas industry. All too often, of course, gas undertakings have to shoulder the blame for explosions of which coal gas is innocent, but the fact remains that something will have to be done, perhaps by co-operative effort, to render the possibilities of underground explosions in subways, street boxes, and so on, remote. Recent experiences, of which the disaster in the Post Office tube in Holborn affords a striking example, have demonstrated clearly enough that some means must quickly be found for indicating at a central station any leakage of gas into an underground chamber.

Our readers will therefore be interested in the following brief



The Ringrose "Gas Sentinel."

description of a reliable indicator manufactured by W. R. Patents, Ltd., of Leeds, whose claims regarding its performance will, we think, be wholly substantiated in practice. We express this opinion after close inspection of the device and of its operation, and bearing in mind that it differs in no way in principle from the widely used Ringrose gas and firedamp alarm and safety lamp. The latter has been approved by the Ministry of Mines under their Order No. 169, of 1928; and its reliable and entirely satisfactory working in many collieries provides ample justification for our belief that the modification here described will share an equally happy fate and bring about an equally happy condition of safety. Not only will the new device give warning of any accumulation of gas, but it will at the same time set in motion the means for dispersing it.

In construction, as can be seen from the accompanying photograph, the Ringrose "Gas Sentinel" is robust and simple; and its operation is correspondingly free from complication. It consists of a strong outer case perforated in certain places; the perforations being covered with gauze. Inside the case is a small porous pot in which a strip of palladium wire is kept constantly in a glowing state. The current for this is taken from a telephone cable, and the consumption is less than that of a very small electric lamp, and costs approximately 5s. per annum. When the atmosphere surrounding the instrument becomes contaminated by the presence of hydrocarbon gas, the latter passes through the porous pot, and the hydrogen burns to water. Condensation of the latter produces a partial vacuum, and this breaks an electric circuit and brings into operation an electric fan. At the same time it indicates at the central station that gas is present in that particular underground chamber or box. When the gas has been dispersed, and reduced to below 1¼ p.ct. in the chamber, the instrument signals "all clear," and re-sets itself ready for a further indication. It will do this thousands of times without attention. If, of course, the "all-clear" signal is not given quickly, then the telephone operator at the central station communicates immediately with the distribution department of the gas undertaking concerned.

The "Gas Sentinel" is fool-proof, for, should any fault occur in its signalling circuit, the appliance signals and assumes the "danger" position. Explosion risks must be minimized. The best way to effect this is to detect the gas before it reaches a dangerous percentage, and at the moment of detection arrange for a warning to be given and for means of dispersing the accumulation of gas. This, as described, is the *modus operandi* of the "Gas Sentinel."

ILLUMINATING ENGINEERING SOCIETY'S PROGRESS.

Twentieth Anniversary Dinner.

Founded in London in 1909, the Illuminating Engineering Society has now been in existence for twenty years; and the fact that it has reached this milestone was made the occasion of an extremely enjoyable function on Wednesday of last week, at the Trocadero Restaurant. Dinner, at which considerably over 150 sat down, was followed by a short toast list, and then there was dancing. The arrangements throughout afforded evidence of the organizing ability of the Hon. Secretary (Mr. J. S. Dow), and all who had assisted him. During its twenty years of life, the Society has made great progress; and the speakers, in emphasizing this, made due acknowledgment of the large amount of work done by the late Mr. Leon Gaster to bring about this success. The President of the Society (Mr. Clifford C. Paterson, O.B.E.) was in the chair; and there were present a large number of distinguished guests.

The toast of "The Society" was proposed by Mr. H. T. Tizard, C.B. (Secretary of the Department of Scientific and Industrial Research), who expressed genuine admiration of what the Society had done in the past, and a firm belief in what it could do in the future. It was, he said, through the efforts of the Society that his Department had started research in illumination, which they had no intention whatever of giving up. There had been extraordinary developments in artificial lighting in the last hundred years; but even now the result was a feeble one. In the case of a turbine, one could get from 25 to 30 p.ct. of heat energy into mechanical work, whereas in lighting the proportion was only about 3 p.ct. Thus they were even now a long way from making the best of what they had. No doubt it would be argued that the streets were far better lighted to-day than ever before, but when one considered the greater demands made upon them, it would not be wrong to say that they were very badly lit.

In the course of his reply, the President pointed out that in 1931 the Society would have a great duty to perform. They were responsible for the chief arrangements in connection with the visit of a large number of foreign delegates to this country for the International Congress on Illumination. He begged all present to keep in mind September, 1931.

A GASTER PREMIUM.

In the course of his further remarks, Mr. Paterson announced the determination of the Council to establish, at the beginning of the next session, a Gaster Memorial Fund, the interest on which could be utilized for the purpose of enabling an award to be given for the best contribution in any session to the proceedings of the Society. This would be known as the Gaster Premium.

The toast of "The Visitors" was proposed by Mr. D. R. Wilson, C.B.E., M.A. (Past-President), who drew attention to the large proportion of street lighting by gas that was still to be found. He expressed the opinion that the developments in gas lighting had been just as great as those in connection with electricity. He alluded to the presence of Mr. J. F. Colquhoun (the President of the Institution of Public Lighting Engineers), whose extraordinarily interesting demonstration of street lighting by different methods had attracted so much attention at Sheffield last summer.

Mr. John Terrace, M.Inst.C.E., in reply, remarked that the Institution of Gas Engineers, of which he had the honour to be President, was one of the very earliest bodies to be interested in the question of illumination from a scientific point of view.

LIGHTING THE BACKBONE OF THE GAS INDUSTRY.

Mr. Terrace went on to say that it was perhaps a little unfortunate that the commercial success of the gas industry during later years had turned to such a great degree on other points than lighting, because he felt the idea was getting abroad in some quarters that gas as a lighting agent was a thing of the past. Against any such idea he desired to utter a very strong protest. The industry had many magnificent examples of gas lighting to show, in streets, factories, and homes; and they could still claim that the lighting load was the backbone of the gas industry. They hoped for many years it would remain so; and if it did not, it would not be the fault of the gas industry. He expressed appreciation of the wonderful work done by the Society, and wished it every success.

MISCELLANEOUS EXHIBITS.

With so many stands to describe in the Gas Industries Section, it has been impossible to note more than a very few of the exhibits in other parts of the Fair. There is, however, much else which will be of interest to gas engineers; and friends who are showing novelties will secure mention of them by communicating with us.

British Thomson-Houston Company, Ltd.,

Rugby.

Specializing as they do in the manufacture of electric plant for every industrial requirement, the Company are showing a wide range of electric motors, control gear, switch gear, &c.

The Carron Company,

Carron, Falkirk.

The Carron Company, in the display of their gas cooking and heating appliances, show examples of fires, mantel registers, and cookers which have proved very popular in some of the latest and largest housing schemes throughout the country. The fires are shown in a variety of attractive finishes to harmonize with any scheme of home decoration.

The Company devote part of the stand to their cooking apparatus for hotels, hospitals, &c.; and included in the exhibit is a double-oven gas heated range with flat top and enclosed hotplate. This range is typical of the appliances in this section, for which the Company hold a high place in the catering world.

Davey, Paxman, & Co., Ltd.,

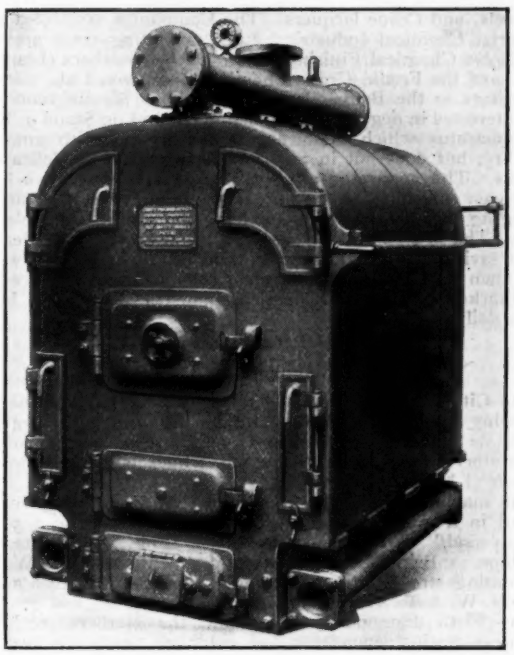
Colchester.

This firm are exhibiting on Stand No. 1, Block 17 H., two vertical crude oil engines, the smaller being of 50-57 B.H.P. twin-cylinder, and the larger of 160-184 B.H.P. four-cylinder. Both engines are built on the well-known Paxman principle of unit cylinders and ventilated crank cases. The injection of the fuel is on the Blackstone patent "spring injection" system, and the design of both engines embodies the Paxman patent eccentric operated exhaust valve gear. An accompanying photograph illustrates the general arrangement of the larger engine.

Both engines are shown running under their own power on ordinary fuel, and will be stopped and started to demonstrate the simplicity of this operation. The extreme evenness of the distribution of the fuel to all cylinders serves to demonstrate the benefits to be obtained by having independent fuel pumps to each cylinder, particularly since these pumps and their pipelines are free from any pressure, which is the case with the "spring injection" system. The smooth running of these engines is particularly noticeable, and is due to very careful balancing, manufacture, the "spring injection" fuel system, and the patented valve gear.

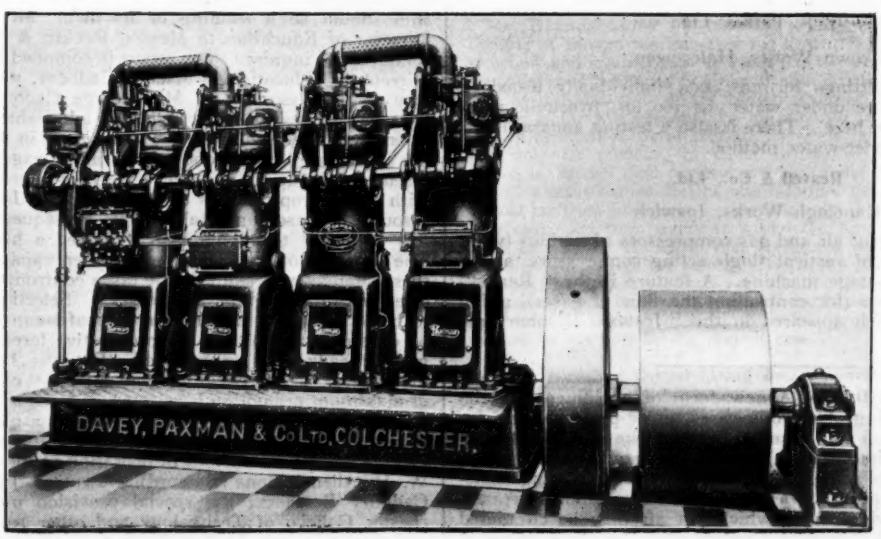
Other separate parts of the engine are exhibited, including a sectional head completely fitted up with valves and camshaft which can be operated by hand to demonstrate its working.

Also exhibited are two sizes of the Paxman patent all-steel sectional boiler. This type of boiler offers many advantages over the ordinary cast-iron pattern. As it is manufactured of mild-steel plates, the risk of fracture is avoided, and at the same time the life of the boiler is materially increased. It is built up on the multiple unit system. Each section is self-contained, there being no water joints to make (or leak) between them. The front and back sections are water cased, and the gases actually pass three times along the length of the boiler, which has a double return flue, thereby effecting a considerable economy in fuel. There are no tubes—only straight flat surfaces which



Paxman All-Steel Sectional Boiler.

can easily be swept through from the doors at each end. These boilers are made in three types—namely, for central heating by means of hot water, central heating by means of low-pressure steam, and hot water supply for domestic and other purposes.



160-184 B.H.P. VERTICAL FOUR-CYLINDER CRUDE OIL ENGINE BY DAVEY, PAXMAN, & CO., LTD.

Expanded Metal Company, Ltd.,

York Mansion, Petty France, London, S.W.

The Company are making a feature of "Servarising" treatment of metal articles to protect them from oxidation at high temperatures. The treatment consists of applying to iron and steel an unbroken surface of aluminium which, passing into, and alloying with the basic metal, forms a homogeneous envelope undetachable and non-scaling at temperatures even above 1000° C. The process should interest those concerned with gas fired, oil fired, or pulverized fuel burning installations.

Imperial Chemical Industries, Ltd.

An intriguing stand at the Fair is No. 9, K. 1, where the visitor may see some of the latest developments in cellulose finishes for all industrial purposes, cellulose wood finishes, coloured furniture enamels, lacquers for wood and metal, and spray enamels which also include cracking enamels providing some fine and bizarre effects.

Another product which attracts considerable interest is "Necol" plastic wood, which is like putty when fresh, and like wood when set. Other items well worth inspection are Naylors' varnishes, paints, and stains, "Necol" coloured frosting enamels, and Crane lacquers. The Companies associated with Imperial Chemical Industries, Ltd., exhibiting these products are Nobel Chemical Finishes, Ltd., Naylor Brothers (London). Ltd., and the Fredk. Crane Chemical Company, Ltd.

Visitors to the British Industries Fair at Birmingham who are interested in degreasing problems will find on Stand 9, K. 2, an apparatus which dissolves oil and grease with amazing rapidity, but does not in any way harm the most delicate of metals. The apparatus effectively degreases successive loads of greasy machine or metal parts without the necessity of changing the chemical bath supplying the non-inflammable solvent. The process greatly reduces labour costs and effects a great saving of time. Demonstrations of this apparatus, which is known as Crawshaw's chemical colander, and is placed on the market by Imperial Chemical Industries, Ltd., are being given daily.

Industrial Research Laboratory.

(City of Birmingham Gas Department.)

The City of Birmingham Gas Department have in the Engineering Section a separate stand dealing with the strength of materials and the chemical and metallurgical sections of the Laboratory, apart from the stand which is devoted to the Industrial Heating Section.

The machines and apparatus shown represent the plant installed in a modern public test house, and comprise a 50-ton "Universal" testing machine, an "Izod" impact testing machine, a Brinell hardness testing machine, and a Wohler alternating stress testing machine. All these machines are of Messrs. W. & T. Avery's manufacture.

The Firth diamond hardness and the Herbert pendulum hardness testing apparatus are exhibited, and also various instruments made by the Cambridge Instrument Company, Ltd., dealing with measurements of pyrometry and the recording of vibrations, thus covering the range of investigations and routine tests which are from time to time carried out by the Industrial Research Laboratories at the Council House.

All the machines and apparatus are fixed up for demonstration purposes, and tests on materials from other stands are being carried out free during the period of the Fair.

In addition to the above, a small measuring machine and a collection of measuring gauges are shown, illustrating a further side of the Laboratory's activities.

G. B. Parkes, Ltd.,

Crown Works, Halesowen.

Malleable pipe fittings for gas, &c., individually tested to 100 lbs. air pressure under water, or 300 lbs. hydraulic pressure, are to be seen here. There is also a testing apparatus for the air-pressure-under-water method.

Reavell & Co., Ltd.,

Ranelagh Works, Ipswich.

This is a display of air and gas compressors of various types, including a range of vertical single-acting compressors, and a double-acting two-stage machine. A feature is the "Reavell-Askania" regulator (for controlling the flow of gases), a full description of which appeared in the "JOURNAL" some time ago.

Silica Gel Gas Driers.—A new form of equipment for the drying and purifying of various gases under pressure, and for the conditioning of air, is announced by the Silica Gel Corporation, of Baltimore. In general, the equipment includes duplicate absorbers packed with silica gel for removing moisture and contaminating lubricant from the gas compressor. An air heater is provided from which hot air may be circulated through an absorber requiring regeneration for the purpose of driving moisture and impurities from the gel. In some installations coolers are also provided.

RIO DE JANEIRO GAS-WORKS.

Visited by the President of the Republic of Brazil.

The December issue of "Light," the house organ of the Rio de Janeiro Tramway, Light, and Power Company, contains an interesting account of a visit paid to the gas-works and the electricity distributing centres of the Company by Dr. Washington Luiz, the President of the Republic of Brazil. From the section dealing with the visit to the gas-works, where His Excellency was received by Mr. Oswald Allan, the Works Manager, and by Dr. Novaes, the Engineer of Manufacture, we gather that Dr. Washington Luiz made a very thorough examination of the whole of the plant, which presents a number of features of interest.

Coal imported from England or the United States is received in large lighters and discharged by an electrically operated discharge tower at the rate of 100 tons per hour, being delivered by an elevated railway and movable bridge of 250 ft. span to the stock piles, which are capable of holding up to 50,000 tons. The same bridge serves to pick up the coal from any portion of the stock heap by means of a 3-ton bucket, and the elevated railway conveys it to automatic weigh hoppers, from which it is fed to the retort house elevators.

The existing production plant, consisting of 500 Dessau vertical retorts and vertical chamber ovens, and two 3-million c.ft. per day water gas plants, is being extended by the installation of a Glover-West vertical retort plant of 3½ million c.ft. per day capacity, with elevated coke storage hoppers capable of holding 1000 tons of screened and graded coke.

The condensing and exhauster plant is on standard lines, with vertical centrifugal washers of modern type; and final purification is by oxide of iron in four steel and four concrete purifying boxes of large capacity. Three station meters of the Roots type, each with a capacity of 350,000 c.ft. per hour, measure the gas produced. All tar produced is treated in a plant forming part of the works, and is distilled to pitch or intermediate products.

The compressor house, where compressors totalling 1550 B.H.P. force the gas into the high-pressure mains network, and the recently constructed waterless holder merit special reference; and the President showed himself particularly impressed by the close scientific control exercised throughout the whole of the works, from the recording pyrometers on the retort benches to the recording calorimeters on the various gas streams from the different retort houses and the carburetted water gas plant, enabling any variation in conditions throughout any part of the plant to be immediately located.

The production of gas in 1927 was 2790 million c.ft., of which 37·3 p.ct. was carburetted water gas. The average sale of gas per consumer, calculated from the figures given in the article, amounts to 64,500 c.ft. per annum, which will compare favourably with the bulk of even our industrial towns in this country.

At the conclusion of the visit the presidential party were entertained in the large and well-equipped restaurant at the works.

Report on Education for Foremanship.—There has been published by the Association for Education in Industry and Commerce, a Report on Education for Foremanship (price 9d. each; 7s. 6d. per dozen; or 6s. per dozen for not less than 50 copies. Obtainable from the Hon. Secretary, Mr. R. W. Ferguson, 36, Linden Road, Bourneville, Birmingham). The Association conduct each year some definite piece of investigation into education in industry; and in 1922 they issued a report on Education for Industrial Management. They now claim that foremanship should be a training of its own. Mr. Percival Leech, Director of Education to Messrs. Reckitt & Sons, Ltd., again conducts the inquiry. The report is compiled by Mr. Ferguson, Director of Education to Messrs. Cadbury, who is Hon. Secretary of the Association. Mr. George Cadbury, a Past-President, introduces the report with an admirable definition of the foreman, showing him as the nodal point in the works. From his experience, Mr. Cadbury tells of the eagerness with which foremen take up the training once it is offered. He concludes with the appropriateness of the Report: "Industry is passing through a phase comparable in its consequences and possibilities with that through which it passed a hundred years ago. The presence of well-informed foremen capable of interpreting these changes will simplify the tasks confronting managers and directors of our great businesses." Selection to-day appears to be by character rather than by craftsmanship. There must be different training for the prospective foreman and the foreman already long experienced. For the latter especially it must be a "conference" rather than a "class." The vision of maximum promotion is rejected; "foremanship is the goal." The body of the book is the planning of a course of workshop promotion, and the various methods of training. Appendices include reports of schemes in operation at the works of Messrs. W. H. Allen & Sons (Bedford), Rowntree, James Pascall, and Cadbury Brothers; the special provision made at the Manchester College of Technology and other technical institutes; and the half-yearly Lecture Conferences held at Balliol College, Oxford. It is significant that the National Foremen's Association have placed a substantial order in advance.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Frost and Fractured Mains.

SIR,—In connection with several recent inquiries into the causes leading to fractured mains, mention has been made, on more than one occasion, of the effects of frost; some of the witnesses stating their opinion emphatically that frost had directly caused the fracture. Others, more cautious, considered that the frost might have been a contributory cause of the trouble.

It should be quite clearly understood that in these latitudes no frost, however severe, could possibly penetrate the soil to such a depth as would have the slightest effect on a cast-iron pipe. Indeed, it is doubtful whether cast-iron is affected in any degree even when directly exposed to the severest frost experienced in these islands. If it were, our lamp posts would snap like pipe-stems.

And yet it is a common experience that two or three days' frost is always accompanied by a slight epidemic of broken mains. In my own district, as soon as frost sets in we overhaul our emergency chest, so as to have everything in readiness for a sudden demand. The result follows so regularly as to become almost a matter of course.

The explanation is to be found in the fact that twenty-four hours' continuous frost seals up every crack in the roadway or footpath, and every joint between flags or paving stones, and so compels an escape of gas to take some other course rather than disperse itself through the soil and make its way into the atmosphere through the surface, now hardened and closed by the frost.

This explanation is at least more reasonable than to suppose that frost can penetrate two feet below the surface in these latitudes, and render a cast-iron main brittle and therefore more easily fractured. I have frequently come across cases of broken mains, first revealed during a frost, whose fractured surfaces showed that the break had occurred many months prior to the advent of the frost.

"A. Z."

Feb. 14, 1929.

LEGAL INTELLIGENCE.

ALLEGED STREAM POLLUTION BY GAS COMPANY.

L. J. Pettit *v.* Redhill Gas Company.

After the hearing had occupied nine days before Mr. Justice Macnaghten in the King's Bench Division, a settlement was arrived at in the action by Mr. L. J. Pettit, of Hamme Farm, South Nutfield, near Redhill, against the Redhill Gas Company (see "JOURNAL" for Feb. 13, p. 425).

Mr. Pettit alleged that his herd of Friesian cattle and his farm land had been impaired by the pollution by tar deposits, &c., from the Redhill Gas Company's Works, of a stream that ran through the property. Before the plaintiff's case had been completed, the parties came to terms which were not disclosed in Court.

REGISTER OF PATENTS.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 13.]

Nos. 3607—4462.

BROWN, J.—"Gas cooking ovens." No. 3974.
CHAPMAN, F. W.—"Geysers." No. 3912.
GEWERKSCHAFT M. STINNES.—"Purifying gases from naphthalene." No. 4011.
GRAY, J. E.—"Apparatus for lighting coal fires by gas." No. 3626.
KIMURA, S.—"Safety device for gas conduits." No. 3926.
MACGRATH, G.—"Gas taps." No. 4199.
SOUTER, J.—See Gray, J. E. No. 3626.
TAYLOR, J.—See Gray, J. E.—No. 3626.
WAITE, M.—"Gas cooking stoves." No. 3609.
WARNANT, E. F. J.—"Filters for gas engines." No. 4460.
WESTERN GAS CONSTRUCTION COMPANY.—"Gas-making control apparatus." No. 4441.
WINGFIELD, B. R.—"Automatic gas valves." No. 3985.

Speaking at the Jubilee Hall, Stockton, on Feb. 11, Miss Margaret Bondfield, M.P., referred to the misuse by this country of its coal. Arising out of the Ruhr reparations, she said that German mine owners had been forced to work upon a most economical basis, and on their present system of treating coal they benefited to the extent of 13 p.ct. In this country, however, no effort had been made to gain that extra 13 p.ct. from coking and bye-products. Another way in which we were not using coal to its fullest extent was for the purpose of generating electricity. It was no excuse to say then we had no supply of water power. We had great coal supplies—in fact more coal than we could use—and we could generate electricity quite easily. In rural electricity we were much behind other countries. In Germany, where 35 p.ct. of the population were on the land, 95 p.ct. of that land had had electric power brought to it.

PARLIAMENTARY INTELLIGENCE.

[From Our Special Correspondents.]

HOUSE OF LORDS.

Government Gas Bill.

It is understood that the long-awaited Government Bill dealing with some of the non-controversial aspects of the gas industry has now been completed, and is to be introduced into the House of Lords by Lord Salisbury very shortly. Inquiries at the House on Monday morning showed that no official notification of the date of its introduction had yet been received there. It is not necessary, however, for notice to be given in advance; and the Bill may make its appearance any day this week.

Private Bills and Special Orders.

The Examiners of Private Bills have reported that the Standing Orders applicable to the Winchester Water and Gas Bill have not been complied with.

A Special Order made on the application of the Barnard Castle Gas Company has been laid before the House and referred to the Special Orders Committee.

The Aldershot Gas, Water, and District Lighting Bill was read a second time on Feb. 12. The Romford Gas Bill and the Wandsworth District and Epsom Gas Bill have been referred to the Examiners. The latter Bill was put down for Second Reading on Tuesday, Feb. 19.

HOUSE OF COMMONS.

Private Bills.

Numerous petitions against Private Bills have been presented by gas undertakings. These include: Llanelly Gas Light Company, against the Llanelly Corporation Bill. Barmouth Gas Company, against the Barmouth District Council Bill. Chester United Gas Company, against the Chester Corporation Bill. Leamington Priors Gas Company and Warwick Gas Company, against the Leamington and Warwick Traction Bill. Gas Light and Coke Company, against the Royal Victoria Docks Approaches Bill. Southampton Gas Light and Coke Company, against the Southern Railway Bill. Gas Light and Coke Company, against the Westminster City (Millbank) Improvement Bill.

On the other hand, the various Bills promoted by gas undertakings are themselves the subject of numerous petitions, as follows: The Gas Light and Coke Company's Bill is being opposed by the following Gas Companies. Bishop's Stortford, Harlow, and Epping; Hornsey; North Middlesex; Romford; Southgate and District; Lea Bridge District; Brentwood; Uxbridge, Maidenhead, Wycombe, and District. Opposing petitions have also been put in by the Ruislip-Northwood District Council, the Lee Conservancy Board, the Middlesex County Council, and the Conservators of the River Thames.

The Newcastle-upon-Tyne and Gateshead Gas Bill is opposed by the Corporations of Wallsend, Tynemouth, and Gateshead, and by the Urban District Councils of Prudhoe, Seaton Delaval, Whitley and Monkseaton, and about twelve other adjoining districts. Imperial Chemical Industries are also petitioning against this Bill. The South Suburban Gas Bill is opposed by the Northfleet District Council; and the Winchester Water and Gas Bill by the Winchester Corporation and by Mr. Samuel Bostock.

Special Orders.

Plans have been deposited in connection with the Oxford Gas Order, the Wateringbury Gas Order, and the Prescot Gas Order.

Road Construction and Maintenance (Tar).

Mr. HANNON asked the Minister of Transport the value of the imports of foreign tar imported for use in this country in the construction and maintenance of roads; if he was aware that the gas and coke oven industries in Great Britain produced annually 2,000,000 tons of tar derived from the carbonization of coal; and if, as that volume of tar was adequate for all purposes in the construction and upkeep of roads in Great Britain, he would take measures to secure that only tar produced in Great Britain would in future be employed in British road construction and maintenance.

Col. ASHLEY replied that he was informed that in 1928 the imports of coal tar from foreign countries amounted to 295 tons, of the value of £1967, and from countries within the Empire 1201 tons, of the value of £3753. He added that no figures were available as to the proportion of foreign tar actually used in the construction and upkeep of roads; but it was evidently very small. He said he was constantly impressing upon highway authorities the importance of using British materials, but there appeared to be no grounds for special intervention on his part in the present case.

Cost-of-Living Index Number.

Sir HARRY BRITTAIN asked the Minister of Labour whether the item in the cost-of-living index relating to fuel and light included electricity, or was based only on gas, coal, oil, and candles.

Sir A. STEEL-MAITLAND replied that the cost-of-living index number was designed to indicate the cost of maintaining unchanged the pre-war standard of living of working-class families. As electricity was much less important than gas as a means of light and heat in working-class dwellings before the war, it was not included in the fuel and light group of items used in the compilation of the cost-of-living index number. That group, he added, comprised coal, gas, oil, candles, and matches.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

Annual General Meeting.

The Ordinary General Meeting of the Proprietors of the Company was held at the Cannon Street Hotel, E.C., last Wednesday—Dr. CHARLES CARPENTER, M.Inst.C.E., in the chair.

The SECRETARY and ACCOUNTANT (Mr. Frank Day) read the advertisement convening the meeting, and the minutes of the last ordinary general and extraordinary meetings. Thereafter the seal of the Company was affixed to the Register of Proprietors.

THE ADDRESS OF THE PRESIDENT.

Ladies and Gentlemen,—It has been customary upon these occasions to take as read the Report of the Directors, and for me to use it as a basis for my remarks in asking your adoption of it and the accompanying Accounts.

MONTHLY ACCOUNTS.

You will have observed that while there has been an increase in the number of our consumers, this has been accompanied by a slight reduction in the consumption of gas. This is easily understandable when one looks back at the mild weather which prevailed during the latter part of the year, and which was bound to affect that portion of our supply which is used for heating purposes. The past month of January has, on the other hand, been colder than usual, so you will not be surprised to learn that during that period our sales increased by over 10 p.ct. The two chief loads in our business are those for lighting and for heating. The former changes with the seasons, and the latter with the climate; and it is this portion of our output which adds to or reduces the prosperity of our business. Now it is because of this climatic variability that the bulk of complaints of the cost of gas arises. In the ordinary way the extra gas consumption during January, to which I have referred, would have been brought to the user's knowledge about the middle of April, by which time there would have been left behind, and he would have forgotten, all indications as to what January weather was like. When he is basking in the warmth of April sunshine he does not remember how the sun deserted him during January, and how much he was then relying upon the Gas Company for heating as well as lighting his home. He becomes dissatisfied, says that gas fires are too costly for his purse, and probably writes a curt letter to the Company, ordering their removal. Now in order to overcome trouble of that kind, we instituted nearly a year ago a system of monthly meter inspecting and account rendering. The new system has proved a great success, and though in a few isolated cases there are still some objections to the abolition of the quarter-day accounts, the great majority of our consumers have welcomed the change. As one of them told us (I use his own words), "The change is one of the finest the Company has ever made. I can now keep a close check upon my gas consumption, and thereby avoid its wasteful use." But, it may be argued, is not this merely sharpening a razor with which to cut your own throat? Nothing of the sort. We want a maximum of satisfied consumers, and a minimum of dissatisfied ones. We know that if gas is used intelligently it will prove economical as well as convenient, and we are confident that the change in recording, to which I have referred, will prove an important contributory factor in bringing about an increase in the popularity of gas. This change of procedure would have been a costly one but for the opportunities afforded by the modern machines, operated by female clerks, which are rapidly taking the place of male clerks equipped with pen or pencil. Exactly the same procedure would have to be followed whether the accounts had to be rendered monthly or quarterly, and on the face of it you would say we were incurring additional expense by adopting the new method. We have, however, been able to adopt this new process, by the aid of machines now so common in large undertakings, without any increase in expense.

As a corollary to these proposals I would like again to testify to the sympathetic attitude of the banks to our proposal, for, while the making up and rendering of the accounts themselves was a matter easy to arrange with modern machines, there is no such method available to us for their collection. Fortunately, as I said a year ago, our banking friends responded to our call. With the enormous increase in banking facilities which the progressive policy of the banks has provided, it would have been little short of extravagance to continue a collecting system by house-to-house calls, now so obviously out of date. Under the new arrangement money may be paid into our account at any of the branches of the Midland or Barclays Banks in our area of supply; and while this has proved a great boon to our own consumers, I feel sure it will not be without effect in encouraging what I will call the banking habit among our consumers.

REDUCED REVENUE FROM BYE-PRODUCTS.

Coal, as the report tells you, has been purchased at reduced prices. Unfortunately, the saving in coal costs has been largely discounted by the lower revenue from bye-products, so that the net result shows a lesser saving. It is, of course, as you are aware, the net cost of coal which really matters—that is, its price after deducting returns from bye-products. The prices obtained for these, particularly coke and, to some extent, tar, are found over a period of years to bear a definite relationship to the price paid for coal. There is a certain lag in the time taken for their adjustment, and this may result in one or other of these products being temporarily maintained at a non-economic value. But when coal remains stable over a long period, the revenue from products settles down to a pretty definite ratio. Coke, I may say, reflects more quickly than tar or ammonia the effect of reduced coal costs, as is shown by the lower revenue obtained. The future of tar for road purposes is a very promising one. It is essential not only to maintain a high quality product, but it becomes increasingly necessary to see that the methods adopted for its application to road surfaces are suitable ones. Tar has suffered too much in the past from the unmethodical and even unscientific manner in which it has been applied to the roads, and probably in many cases from the unsuitability of the particular tar used for the purpose.

CLEANER COAL.

I am glad to be able to say that our efforts to obtain cleaner coal continue to meet with success. You will remember the picture I gave you on a previous occasion, that the total quantity of ash in the coal we purchase necessitated the whole time employment of one of our colliers. That gives you an idea of the amount of unnecessary and harmful material that finds its way down here. Though our progress in this respect is small, we have increased our knowledge of the characteristics of the various kinds we purchase, and are thereby gradually extending a system of buying by quality rather than by description.

The characteristics pertaining to many coals bore in the past a very definite selling value. That value is to-day not so real, and so we buy not on the name, but on the quality, of coal; and as we are buying it for our own use, we can afford to adopt a policy of that kind, which is indeed a very important one to us. There is still very much yet to be done at our collieries before they can put on the market coal as free from ash as that imported from America during the coal stoppage of three years ago. While this matter of clean coal is closely bound up with the economics of gas manufacture, its greatest influence is an indirect one. Our carbonizing process extracts whatever gas or products are contained in the raw material; and if coal were merely bought upon a gas content basis, its varying qualities would not seriously matter whichever we use. But the quality of the coke bye-product produced thereby is a very important thing indeed, as this resultant product contains the whole of the original coal ash. It is obvious that, if you put a ton of coal in a retort, and by carbonizing it eliminate the volatile constituents, and there is left behind a solid residual in the form of 15 cwt. of coke, this coke will contain all the ash that was in the original ton of coal. It is fortunate that this can be avoided, and we are eliminating it by the process of cleaning and sizing. There is no doubt whatever that this coke is increasing in popularity for domestic use. Coke is, as you know, the most valuable of our bye-products. Indeed, our Chemical Department are always a little unhappy about the use of the expression "bye-product" as applied to coke. They think there should be more general recognition of the importance attaching to good, uniform, clean coke. With regard to our main product, gas, our system of control has, for a long time, assured this being a uniform article of the highest possible purity. Now we are extending the same oversight and supervision to coke.

LOW-TEMPERATURE COKE.

I must now shortly deal with our arrangements for the production of what is called low-temperature coke. There is no doubt that to-day the public are in a more sympathetic mood to listen to suggestions for rendering life healthier in the Metropolis; and there is no doubt again that this will affect its attitude towards the movement for the total abolition of raw coal as fuel. One cannot imagine that, with all our boasted progress, and increasing civilization, we shall be content to go on for all time burning raw coal. There are two methods of putting this proposal into practice, both of which involve applying to the raw coal a preliminary, either partial or complete, distillation of the volatile (and when discharged into the air harmful) products. In the one case the existing grates would, generally speaking, require to be adapted to the fuel, while the other process produces a fuel adapted to the grates. The carbonizing processes to which coal for these purposes is subjected are called respectively the high and the low temperature systems. They produce not only a different solid product, such as coke, in the one case, and such as "Coalite" in the other, but the resultant gaseous and liquid products differ widely in character. The technology of the low-temperature processes differs radically from the older one; and many problems of great interest are involved with their adoption. We have a good understanding of the problems involved in high-temperature distillation, but there is still a great amount of ignorance as to what is best to be done in connection with low-temperature carbonization; and this will provide a great deal of important work for those concerned.

The two systems which we are about to work on the large scale differ completely in their respective designs, and may be roughly said to represent the two extremes between which various modifications have been proposed. In a general way the two we shall be using may be classified by saying that the one uses small coal, and the other utilizes fines. We shall therefore be able to test the public

requirements with two different products having the smokeless attribute in common, both being combustible in ordinary grates. They will differ to an extent in physical characteristics, but they will both have the general attributes of a smokeless fuel.

Repair and Maintenance Charges.

The next point to which I desire to direct your attention is that of repair and maintenance charges; and for the purpose of making this clear, I must trouble you with a recapitulation of one or two points in our policy during the years following the conclusion of the war. We have, during the last twenty years or so, envisaged a considerable change in our attitude to the process of coal carbonization, which, as you are aware, forms the basis of our industry. Our original problem was the purchase of cheap coal, and of necessity it was to the Durham field that we went for it. We took it as it came, and generally assumed that the suppliers of such large customers gave us of their best. Once alongside our works our main problem was to handle and stack or convey it to our retorts economically, carbonize it, and store for sale the residual coke. But some twenty years or so ago we began to realize more clearly that our problems were not wholly those of cheap buying and cheaply handling a raw material. In other words, that our process was not wholly a mechanical one, but in fact a chemical one; and we set to work to get a staff, or rather to build one up, to meet this altered conception of our requirements. We had this fairly established when war broke out. I need not dwell here upon that period, except to say that the armistice found us with worn-out plants, a tired-out personnel, and our processes in a melting-pot of uncertainty. During the succeeding decade we have not been idle; and to-day I can with confidence affirm that coal carbonization is no longer a guess; it is a science, and one we have gone a long way towards mastering. Our present position is to apply that knowledge as rapidly as our financial resources will permit, and as completely as large-scale experiment proves we are justified.

Association with the South Suburban Company.

You will remember that in February, 1927, you authorized our association with our neighbour, the South Suburban Gas Company; and I am pleased to say the first-fruits of this association are beginning to be gathered by both parties. As the report tells you, the connecting main between the chief works of both undertakings has now been laid, and gas made from coal delivered by ship to our wharves in the River Thames is now available for distribution throughout a total area of something like two hundred square miles. The gas thus sold in bulk has not been included in the figures of gas sold with which I dealt at the commencement of my remarks.

The report further informs you that the Capital Powers Bill authorized at the meeting a year ago received Royal Assent in due course, and by it our capital authorization has been brought well up to our requirements. We shall probably make an issue in the first half of the year, for, as you will have noticed, our capital account is now overdrawn. You will also have noticed that, as the result of somewhat continued pressure upon the Government, a Bill is now being prepared to rectify the anomalous position under which gas undertakings have so long laboured. The Bill will affect this undertaking very little indeed, because you have, with the authority you have given and the money you have supplied, paved the way for the general adoption of principles which we enjoy, and which it is interesting to remind you have been adopted in the case of various electric supply undertakings. We have been the pioneers in the matter, and as pioneers we have had to bear the brunt of the cost in showing the way. That way it is now proposed to follow by the adoption of the same principles in a General Bill.

Dividend.

The rate of dividend proposed is as last year, and the allocation to the Co-partnership Fund of its share of surplus profits is identical with the previous one.

The co-partnership has throughout a difficult period played its part in maintaining harmonious relations between the management and the staff. It is practically a repetition of the story that has been told to you from this chair for close upon forty years. This is, and will be, all the more valuable since, under pressure being put upon us by the action of the Government and its Ministers, our attitude towards labour is *nolens volens* being changed. If you will allow me I will quote from the report of my remarks at the meeting held in August, 1911, when I stated that so happy were our relations with labour that our settled policy was only to adopt labour-saving machinery when the work to be done could not be so efficiently performed by hand. We are now completely reversing that policy by putting in plant the object of which is to reduce labour charges to the lowest possible limit. The reason for this is that each day that passes finds us up against a state-encouraged competition of electric energy supply. In so far as this was only directed to cheapening the cost of current, we should have no fear nor cause for complaint. But an endeavour is being made to build up a monopoly in the supply of heat and light, and force the state-aided product on all and sundry, whether or no they desire it. A few months ago the Minister of Transport took the opportunity, when opening a new bridge, to express his regret that so many new houses were "not being wired for the use of vacuum cleaners, cooking, irons, and other apparatus which ought to be used." I strongly protest against the Head of a very important Government Department, a Cabinet Minister in fact, going out of his way to support proposals which are not only unfair but uneconomic. ["Hear, hear."] And it is not surprising that buildings are being erected by local authorities in which, while as much raw coal as possible may be burnt in the kitchen, and lamps of all kinds, safe or unsafe, burning foreign and imported oil, may be used without restrictions, the use by their tenants of gas whereby to light and at the same time to warm their rooms is absolutely prohibited upon pain of their tenancies being terminated and themselves turned out of house and home. It is very surprising that, after something like fifty years of electrical progress, so unfair an interference with the liberties of municipal tenants should be deemed necessary. I believe the reason given is a lower cost for maintaining the property. This is a very interesting problem; and I think there is a general misunderstanding as to what causes the blackening of whitewashed ceilings, and why that blackening is so often more apparent in the case of rooms lighted by gas. In the case of radiators, whether heated by steam or hot water, one notices a patch of black immediately above, and this will be found to be of a sooty nature, though there can be no question there of gas blackening the wall. In London the atmosphere is charged with dust and finely-divided soot; and currents of air rising from any heated source—radiators or even electric bulbs—cause these fine particles to pass in the direction of the ceiling, where they come to rest, and stick there. I have a little workroom in a cottage where I spend as many of my week-ends as possible, and this has white ceilings and white walls. It is lighted by gas, and yet the walls and ceilings are as white as when they were originally decorated. There is no dust, and, consequently, there is no deposition of black above the burners. What happens when gas is not used as an illuminant is that the dust which would otherwise be deposited on the ceiling is kept floating about in the atmosphere, and so is inhaled to a greater extent. It seems very unfair on the part of the authorities that they should make such restrictions with regard to the freedom of their tenants to use whatever source of light they prefer. They can go to bed by candle light, but they are prohibited from going to bed by gas light.

Improving the Workers' Conditions.

But I was telling you of the reasons for the change in our attitude towards the employment of hand labour. We have, however, extended our vision in another direction—namely, towards seeking and maintaining a higher quality in that which we employ. I feel sure that industry has been too often debited with the impaired health of its workers when the origin should be sought elsewhere. We are now giving to labour an oversight of a similar kind to that generally given to machinery. For just as to-day we need every assistance in improving our technical and mechanical processes, so also do we need to avail ourselves of every opportunity to attain increased efficiency in the human element by which it is set going, worked, and maintained. You may have noticed recently in the Press references to the large increase in the number of what are called "heart cases;" and, judging from our own experience, much more disability arises from this cause than the much-dreaded one of cancer. We have fortunately been able to secure the sympathetic help of one of the greatest authorities upon this subject—namely, Dr. J. Strickland Goodall, the eminent cardiologist—and with the machinery set up by him we have, through our own medical officers, been able to do two things. We have, on the one hand, been able to point out troubles, and nip them in the bud; and, on the other, either by lightening employment or superannuation, provide alternatives to continuing at work with possible fatal consequences. Upon this subject I should like to say that I am inclined to believe we are in this country going in too much for what I will call injudicious and unregulated sport. You may be surprised to hear that we have many cases of promising young men, and even lads, applying to us for engagement and found to be suffering from impaired health through too much or injudicious racing or football during immaturity, to a degree as to render them unsuited for employment with us. In very many instances Sunday is looked upon as a day of sport and hard work, rather than a day of rest and leisure. This may be understandable when the weekly occupation is wholly sedentary; but when practised by those engaged in manual labour all the week, there are certain obvious objections. I believe physical exercise carried out under careful and regular medical supervision would do far more in raising the standard of fitness than the indiscriminate indulgence in sports which are certainly of doubtful value to the less sturdy or the weak.

The changes in the Directorate will be dealt with in due course, but before concluding I would like to pay tribute to the services of Mr. E. Honoratus Lloyd, K.C., and to the loss which the Board has sustained by reason of his ill-health and the resulting permanent retirement. When he was invited to join this Board he was one of the leading advocates at the Parliamentary Bar, with an unsurpassed knowledge of all matters pertaining to gas legislation. It is our sincere hope that the return of better health may come about as the result of the complete rest he has been compelled to take.

I have now formally to move:

> "That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The Vice-President (Mr. Frank H. Jones) seconded the resolution, after which questions were put by one of the proprietors present.

Mr. Byers asked whether it would not be possible for the Directors to revert to quarterly meter readings and accounts, in the case of those consumers who might prefer the old basis. He thought that consumers who had a large number of meters would be inconvenienced by the new plan.

Prof. H. E. Armstrong congratulated the Board heartily on the report presented that day. He had with him a receipt from the Phœnix Gas Company, dated November, 1877, and he had remained faithful to gas ever since. He always congratulated himself on this fact when he entered the houses of friends who were using electricity in place of gas. There could not be anything better than the light which the South Metropolitan Company gave to their consumers to-day; and he was sure it was preferable to any system of electricity. He was particularly interested in the references to low-temperature carbonization, which would mark a new era in the policy of gas undertakings. It might even happen that in future practically all the coal burned in towns would pass through the gas-works. He could foresee a great burden coming upon gas undertakings, which he believed they could well shoulder. After all, what was proposed was to supply again the soft coke which was produced in the early days of the gas industry when iron retorts were used.

Mrs. C. L. H. Booth asked whether the reason for the employment

of girl labour was that it was cheaper. Secondly, whether the Directors had considered the advisability, when collieries were on the market at such a low price, of becoming the owners of their own coal mines.

The PRESIDENT, in reply, said that, at first, both the Board and the officials were not particularly sympathetic towards a change which involved the substitution of female labour for males, but when the matter was gone into the obvious advantages were so great that the conclusion was come to that it was impossible to avoid making the change. He could not imagine men working machines of this character with the same accuracy and facility as women. Thus the answer was that they employed women for this labour because they could do the work more efficiently than could men. They did not employ them because they were cheaper, but because, owing to their adaptability for working machines of this kind, the ultimate result was more satisfactory. The installation of machines was a most interesting one. Not only were the monthly bills made out, but each machine mechanically made up its own total of gas. With regard to the purchase of collieries, this question had been considered from time to time; but the real difficulty was that a colliery produced not only coal of the kind they wanted, but other sorts as well. They would therefore be entering into the business of obtaining something which they did not require for their own purposes. Prof. Armstrong was quite right in reminding them that with the low-temperature coke they would be reverting to something of the nature of the product in the early days of gas manufacture. Whatever happened, it would be necessary for them to go on producing hard coke in considerable quantities for many years to come. He thought it was an advantage that the two low-temperature processes which the Company were trying had both been worked out on a large scale. As to the question of monthly accounts, the dominating fact was that they had had complaints from only 2 p.ct. of the consumers, and some of these were changing their views with increased experience. There was no doubt whatever that at the present time a general move was taking place in the direction of monthly settlements. This system possessed advantages which far outweighed any inconvenience that might be attributed. It was not only the banks who were collecting. The Company possessed a number of showrooms, all of which were available for the settlement of accounts. Therefore the Directors had no reason whatever for departing from the procedure which they had laid down.

The resolution for the adoption of the report and accounts was then put to the meeting, and carried unanimously.

THE DIVIDEND.

The PRESIDENT then moved:

> That the following dividends be now declared—viz., 6 p.ct. per annum for the half-year ended Dec. 31 last on the preference stock, and 6¼ p.ct. for the year ended Dec. 31 last on the ordinary stock, *less* the interim dividend paid in respect of the first-half of the year; and that warrants be transmitted to the registered addresses of the proprietors by post for the amount of such dividends.

Mr. J. D. PAYNE, in seconding the resolution, said that, as this was his first appearance as an Employee Director, he would like to take the opportunity of expressing his appreciation of the honour which had been done him by his fellow workers, and his thanks for the kindness with which the Directors had received him.

RE-ELECTIONS.

On the proposition of the PRESIDENT, Mr. Frederick McLeod and Dr. E. Frankland Armstrong were re-elected Directors of the Company. The President remarked that Mr. McLeod required no introduction from him, as he was so well known to all the proprietors. As for Dr. Armstrong, he was a prominent figure in the chemical world, and the Board regarded him as a great acquisition.

Mr. F. MCLEOD, returning thanks, said he regarded it as a great privilege to have the opportunity of continuing to serve the Company.

Thereafter the retiring Auditor (Mr. John H. Fry) was re-appointed.

Mr. HOUNSOM proposed a vote of thanks for their services to the President, Directors, officers, and employees of all ranks; and this was heartily accorded by the large number of proprietors present.

The PRESIDENT, on behalf of all included in the vote, thanked the meeting, and announced that the Company had sent out on the previous day 36 p.ct. more gas than on the corresponding day of last year. Thus, he said, the proprietors would understand that the staff were exceedingly busily occupied.

COMMERCIAL GAS COMPANY.

Annual Ordinary Meeting.

The Annual Ordinary Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW, C.B.E. (the Chairman), presiding.

The GENERAL MANAGER AND SECRETARY (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

HIS MAJESTY'S ILLNESS.

The CHAIRMAN: Gentlemen,—I think it will be in harmony with your wishes that we record to-day the thankfulness which we all feel at the recovery of His Majesty the King from his long and serious illness. A large number of the houses in the district which our Company serves are, as most of you are aware, tenanted by people of alien birth; but our officers tell me that their loyalty and affection for the King were shown in an unmistakable manner during those anxious weeks of December and January which were such a strain on Her Majesty the Queen and the Royal Family, and, indeed, the whole country. I am sure you will agree with me that when we see around us so many signs of communistic tendencies, it is very gratifying to know that the first thought of the foreigners among us was to inquire for news of the King's health, and to rejoice when the improving bulletins were issued.

A PEACEFUL YEAR.

The past year has been a placid one for the gas industry; and if we omit the continued but unnecessary support given by the Government to our chief competitor—electricity—there has been no disturbing factor. The most promising feature was the abnormally mild weather, especially during the last quarter of the year; and this naturally affected gas sales. In the Company's case, during the period mentioned, there was an appreciable reduction in the output as compared with the corresponding quarter of the previous year. We need not, however, be in any way perturbed by the diminution which occurred in our sales of gas, as it was mainly due to the climatic conditions. I have referred on more than one occasion to the large part which temperature plays in the sales of gas; and such sales in East London are peculiarly susceptible to temperature variations by reason of the large quantity of gas sold to the tailoring industry. As doubtless you are aware, a very considerable proportion of the London tailoring industry—and, I might say, the dress, blouse, and millinery trade—is carried on in the Company's district; and I am informed that the mild weather of October and November resulted in the loss of a great part of the winter trade, the King's illness also having an adverse effect. It is possible that with the cold snap which we had early in January some of the trade was recovered, but there is little doubt that an appreciable part of it was lost, as purchases of winter clothing are rarely made at the end of the season.

POPULARITY OF THE GAS FIRE.

Fluctuations in the output of gas are also partly due to the popularity of the modern gas fire. Thanks to the research work of the principal gas stove makers, the present-day gas fire is a scientific apparatus which gives the highest possible efficiency under perfect hygienic conditions. For this reason it is an ideal means of heating either living rooms or bedrooms. For many years past the Company, in common with all other gas companies, has had an enormous demand for these fires. The amount they are used, however, largely depends on the state of the weather. One effect of this intermittent heating load has been the necessity of providing additional holder accommodation. Two years ago, therefore, we decided to erect at the Poplar Works a new gasholder of a capacity of 3¾ million c.ft. The holder has now been completed, and it was brought into use early in December last.

THE LIGHTING LOAD.

I have said that your Directors are not perturbed by the reduction in the gas sales, and you will appreciate this when I say that the sales were only 2 p.ct. down on the year. Since the beginning of the New Year, a period of six weeks, there has been a reassuring increase in the output of gas of 2½ p.ct., and, of course, during the present week the increase has been phenomenal. Though a considerable number of the Company's consumers continue to use gas for lighting, it is no use disguising the fact that the electric lighting undertakings are gradually increasing the number of their consumers. It is extremely difficult to arrive at an accurate estimate of the quantity of gas used for lighting; but our big neighbour, after a lengthy and very expensive census of the apparatus used throughout the whole of their district, estimates that only 12 p.ct. of its output of gas is used for indoor lighting. While the proportion is thought to be more than this on our district, it illustrates the fact that there is little cause for alarm, for even if the whole of the lighting were lost to the Company, there is no doubt that the loss would soon be made up by the demand for gas for other purposes.

As you are, I think, aware, the Commercial Company, being surrounded by other companies' districts, have no virgin soil to exploit, but we have the satisfaction of having a compact district. You will readily recognize that with the present high cost of material and labour—that is, compared with pre-war costs—it is not always an advantage to have to throw out tentacles of mains into surrounding country, especially when the requirements of the outlying districts are unimportant.

PROSPECTS IN EAST LONDON.

Before leaving this aspect of the matter, I should like to refer to the future prospects of East London, which I consider are quite promising. The district has suffered for many years from excessive rates, and the poundage has risen from 8s. and 9s. to 25s. and 26s. These high rates caused many important manufacturing firms to leave the district; and the premises they occupied were left derelict. Now at last there is a prospect of a material reduction in the rates. Stepney, Poplar, and West Ham Borough Councils have all effected substantial savings in expenditure. For the current fiscal year the poundage at Stepney is 15s. 1d. (compared with 18s. 9½d. for the previous year), at Poplar 23s. 4d. (compared with 25s. for the previous year), and at West Ham 22s. 8d (compared with 24s. 6d. for the previous year). The saving in Poplar would have been more had it not been for a remarkable reduction made by the Quarter Sessions in the Port of London Assessment of £100,000 to £30,000, which, I believe, is still the subject of litigation.

The convenience and suitability of East London for manufacturing

purposes is admitted; and if the savings in rates are maintained, there is little doubt that, assisted by the new Rating Act and the additional relief to industry promised by the De-Rating Bill, there will be a revival of trade in the district. Of this there are already signs, for premises which have been unoccupied for many years are being taken. But a little publicity on the part of the Borough Councils, drawing attention to the improved prospects of their district, would, I think, be beneficial. All the four Boroughs are controlled by Labour councillors, who undoubtedly have the interests of the district at heart; and I trust that they will come to realize that the best, and, indeed, the only effective way to improve the conditions of their working-class constituents is to encourage the return of the various trades and industries to East London.

Before leaving the question of rates and their effect on the Company, I would mention that the lower poundage was to a great extent brought about by the reduction in the outdoor relief. For example, in the Stepney Borough alone the amount paid during the first week in November, 1927, was £6628. This was reduced in November, 1928, to £5303—a saving of £1325 per week, or £68,900 per annum.

In Poplar the amount paid out during the six months to March, 1927, was £343,142, and for the six months to March, 1928, it was £274,818—a saving of £68,324 in six months, or £136,648 over the year. This means £205,000 less distributed by the two authorities concerned in the Company's district.

Victoria Docks Approaches Bill.

During the present Session a Bill is being introduced into Parliament entitled "The Royal Victoria and Other Docks Approaches (Improvement) Bill." The Bill is to authorize the construction of a new arterial road from the East India Dock Road to the Docks. It is anticipated that the total cost will be over £2,500,000, of which various local authorities will contribute £630,000; no less than £425,000 coming from the London County Council. The new road will greatly facilitate transport to and from the Docks, and, incidentally, provide employment for a large number of men for several years to come. There are two excellent roads, the Whitechapel and Mile End Road, and the Commercial Road, running through the Company's district; and there are signs of improved trade in these roads. Better and larger buildings are being erected, and the Company have set an example by the erection of new showroom premises at 99, Whitechapel Road. The building and the fitting-up are practically completed; and it is hoped to open the premises to the public within a few weeks.

The Holborn Explosion.

Another matter to which I must refer is the catastrophe in Holborn on Dec. 20 last. You will, I am sure, agree that it was a most unfortunate happening for the gas industry, for whenever there is an explosion it is the invariable rule, in the first place, to attribute it to some fault on the part of a gas company, and however successful the company may be in refuting the statement, some stigma remains, and the public are prejudiced against gas. This Company are not, of course, directly affected by the Holborn case, but I must give expression to our disapproval of the use of subways for the accommodation of gas pipes and electric cables, unless they are adequately ventilated. Electric cables should not be placed in close proximity to gas pipes, and there should be daily inspection of each subway. Fortunately there is only one subway in this Company's district. This belongs to the London County Council, and it conforms to the requirements I have mentioned.

The Accounts.

If you will refer to the accounts, you will observe, in Account No. 3, that during the year there was an expenditure on freehold property of £3518 2s. 4d. This mainly represents a strip of land adjoining the Company's Poplar Works which, when it came into the market, the Company took the opportunity of acquiring. An amount of £7480 has been expended on new and additional plant, and £1587 on new and additional prepayment meter installations. From the revenue account it will be seen that the gross profit was £139,808, which compares with £162,589 in 1927.

Comparing the principal items in the revenue account, coals and oil cost less by £80,387. The saving in the cost of coal is brought about partly by the reduction in the market value, but also because in 1927 we were using and paying for the arrears of American and Continental coal which were contracted for during the coal stoppage of 1926. For the past year the average cost into works was 21s. 2½d. per ton net, compared with 26s. 7d. the previous year.

There was a saving on carbonizing wages of £4075, and, on repairs and maintenance of plant of £33,117; this item of expenditure being unusually heavy in 1927. The increased expenditure of about £10,000 on meters, stoves, and prepayment meters is money well spent. The replacement of up-to-date stoves and fires for obsolete patterns makes the use of them more popular; and the more attention given to meters, the less possibility there is of loss of gas.

Other items of expenditure to which I need not draw particular attention, combined with those I have mentioned, reduce the aggregate expenditure by £104,830 compared with the previous year.

On the other side of the account, gas receipts, rentals, and sundries realized less by £87,852, and residuals realized less by £40,000, of which coke produced less by £20,054, breeze less by £2165, and tar less by £18,362. While the demand for coke is still satisfactory, the average price realized—20s. 7d. per ton—was not so good, being 3s. per ton less than the previous year. With regard to tar, the receipts are less by reason of the fall in the value of pitch. I am sorry to say the sale prospects of the various distillates are not favourable. Pitch appears to be a disappearing market, and there is a reduced demand from America for creosote. We are, however, erecting an improved tar dehydration plant; and it is hoped that the sale of dehydrated tar for road purposes will counteract the anticipated reduction in the receipts for tar sold for distillation.

The decrease in the receipts for gas was mainly due to the lower price charged; the price for the year being 9d. per therm, which compares with 10·4d. and 9¼d. during 1927. As ¼d. per therm equals approximately £20,000 per annum, it is estimated that the reduction in the price means a saving to the consumer of approximately £74,000, and, of course, a corresponding reduction in the Company's revenue.

You will probably have noticed that the amount received for public lighting amounted to £428 only during the year. This represents the net amount after deducting the cost of lighting and repairing the lamps. In 1922 the net receipts from this source amounted to nearly £17,000; but the number of gas lamps are being reduced so quickly, by conversion to electricity, owing to the public authorities in our district having their own electricity undertakings, that it is probable there will be a debit balance for the current year. You will appreciate that the cost of attending to gas lamps dotted here and there over the district is very much more per lamp than if all the streets were lighted by gas.

Excellent Working Results.

The working results of the Company are very good, and we are exceedingly pleased with them. The make of gas per ton of coal was the highest on record, and the carbonizing wages were the lowest since the war. The coal gas produced per ton of coal amounted to 72·89 therms, and the coke made for sale to 11·46 cwt.

The only item on the balance-sheet to which I need draw your attention is the amounted invested—£248,864. This is a large sum; and as there is the possibility that the whole amount might be deemed to be an asset of the Company, I would like to say that £66,439 represents the book value of trustee investments in respect of the reserve fund, £5197 represents the book value of Company's stock purchased for co-partnership purposes, and £177,228 represents the cost of trustee and other gilt-edged investments purchased in respect of the employees' pension fund. There is very little more to which I need draw your attention. From Account No. 5 you will see that the balance available for dividend (after providing for the co-partnership bonus of £20,732) is £117,971 1s. 8d. The final dividend, at the rate of 7 p.ct. per annum, which the Directors recommend should be paid for the half-year to December last, will absorb £72,564 16s., leaving £45,406 5s. 8d. to be carried forward to the current year, which is £7938 8s. 3d. less than the amount brought into the account at the beginning of the year.

It only remains for me to acknowledge with much appreciation the excellent service which all classes and ranks of the Company's employees render year after year. Though I have had the privilege for many years of bearing my testimony to the zeal and ability which the staff and workpeople bring to bear upon their duties, I can assure you that my words lose nothing of sincerity from repetition. The longer I know, and the more I know, the staff of the Company, the greater is my admiration for them. I believe their desire for the Company's welfare and their pride in the concern grow year by year. They are splendidly led by our two Chief Officers, Mr. Bradfield and Mr. Williams, who set an example of devotion and efficiency which inspires the whole personnel of the Company.

It is especially gratifying to the Directors that they have been able during the last few years to augment so considerably the sum set aside for co-partnership bonus, and that the system of co-partnership is now secured to the employees by statutory authority. I am glad to be able to assure you that the true spirit of co-partnership does in fact increasingly animate all ranks of the Company's servants, for it is that spirit which has contributed in no small degree to the success of the past, and it is to the cordial and willing co-operation of all in real co-partnership that we must look for continued and enhanced prosperity in the future.

I now beg to move the adoption of the report and accounts.

The Deputy-Chairman (Mr. H. W. Gell, O.B.E.), in seconding the resolution, said he would like to refer briefly to the great amount of attention which had been devoted during the past year to the anomalous position of the gas industry with regard to restrictive legislation. In the near future there was to be a General Election, and it seemed to him that the time would be opportune for all associated with the gas industry to take any opportunities that might present themselves of bringing this matter to the notice of candidates and Members of Parliament, so that the industry might be given a chance of meeting its competitors on an equal footing.

Mr. W. H. Warth said he thought the Board and officials were to be congratulated, considering the difficulties of carrying on business in the East End of London, upon having presented such a good report. To be only about £8000 short of the dividend was a very satisfactory result, when one remembered the number of empty properties. It reflected, indeed, great credit on everybody who served the Company. He had much pleasure in supporting the resolution.

The report and accounts were then unanimously adopted.

Dividend.

On the proposition of the Chairman, it was resolved:

> "That, pursuant to the recommendation of the Board of Directors, a final dividend be declared for the half-year ended Dec. 31, 1928, at the rate of 7 p.ct. per annum on the ordinary stock of the Company, less income-tax, making, with the interim dividend of 5 p.ct. per annum, less income-tax, paid for the June half-year, 6 p.ct. for the year, payable on Feb. 15, and that warrants for the same be forwarded by post to the proprietors."

Re-Elections and Votes of Thanks.

Mr. Stanley H. Jones, M.Inst.C.E., proposed that the retiring Directors (Mr. W. G. Bradshaw and Lord Marshall, P.C., K.C.V.O.) be re-elected. He remarked that it was quite unnecessary for him to say anything to recommend two such distinguished gentlemen to the proprietors, but he felt he could take the liberty—from his long official association and friendship with the Chairman—of mentioning that, since they last met, Mr. Bradshaw had completed 40 years of service as a Director, and 29 years as Chairman of the Company. They were

all gratified to see him so well, so fit, and so capable at the end of the 40 years' unselfish devotion which he had given to the Company's affairs. Lord Marshall brought to the Board great knowledge of business, and gave his colleagues strength and support which they were delighted to have.

Mr. A. M. PADDON, M.Inst.C.E., seconding, said that this was not an easy Company to administer. Its prosperity in the past had been very largely attributable to the Chairman and Lord Marshall, and the proprietors could not more effectually ensure the future prosperity of the undertaking than by re-appointing them.

The resolution was heartily agreed to, and briefly acknowledged by the CHAIRMAN.

The retiring Auditor (Mr. G. W. Ilsley) was thereafter re-appointed, on the motion of Mr. S. RAYNER, seconded by Mr. WARTH.

The CHAIRMAN said it only remained for him to move that the best thanks of the meeting be given to the General Manager, Engineer, staff, and workpeople of the Company, for their excellent services during the year 1928. He had already paid his tribute to them, and to what he had said there was nothing which could be added.

Dr. CHARLES CARPENTER, C.B.E., M.Inst.C.E., seconded the vote, which was cordially passed.

The proceedings closed with a hearty vote of thanks to the Chairman and Directors, which was proposed by Mr. WARTH, and seconded by Mr. ROWLAND WILSON.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

Annual General Meeting.

The Annual Ordinary General Meeting of the Company was held on Tuesday, Feb. 12, at Cannon Street Hotel, London—Mr. FRANK H. JONES (Chairman of the Company) presiding.

The notice convening the meeting was read by the SECRETARY (Mr. Chas. W. Braine), and the register of stockholders was sealed.

The Directors' report and statement of accounts for the year ended Dec. 31, 1928, were taken as read.

The CHAIRMAN said that the year under review was the 95th in the history of the old Wandsworth Company. They had sold more gas in the year 1928 than ever before in the Company's history; and he added as a matter of interest—though this fact had nothing to do with the year 1928—that they had sold more gas in January, 1929, than in any previous January, and to date they had sold more gas than had ever been sold up to a similar day in any year in the history of the Company. The selling price of the gas sold by the Company was still lower than that of most of their neighbours—on the basis of the average price of all the gas sold by the Company, and not the particular low price which always prevailed in the Wandsworth part of the Company's area. After 95 years, the Board, the employees, and, he hoped, the stockholders, would be very proud of these facts. It did not appear as though the business of gas supply was, as he had heard it described, a moribund business.

EXTENSIVE MAINLAYING AND NEW PLANT.

With regard to the capital account, he said it would probably have been noticed that the Company had spent £110,699 of new capital during the year 1928. This was a very large sum; but when he stated what it represented, the stockholders would, he believed, approve of it. During the year the Company had laid nearly 20 miles of new mains, and had installed at the Wandsworth Works, which were situated on the river, plant with a capacity of about 7 million c.ft. per day. Not only was this plant of the most modern standard, but it was more economical than anything the Company had had before. Owing to the increasing demand, it had been necessary to consider the installation of new plant for producing gas in the future, and it had been necessary to expend a considerable sum of money; but so far as the Board could see at present, they felt that this expenditure was fully justified. He wished the stockholders to understand that the policy of the Board was to make as much gas as possible at the Wandsworth Works, because it stood to reason that it was very much more economical to take coal direct from the ships into the retort house, as was done at these works, than to carry coal by trains, lorries, or by other means. It was well known, of course, that the river and the sea provided a very cheap form of transport.

PROFIT-SHARING AND PENSION FUND.

Referring to the revenue account, he said the Company had effected a saving of nearly £61,000 in the coal bill for the year, but, on the other hand, there was a reduction of £35,000 in the revenue from the sale of residuals. The cost of upkeep of the works was very slightly lower than in the previous year, but he assured the stockholders that all the works, mains, and apparatus were maintained in first-class order. Another matter in the revenue account to which he drew attention was an expenditure of £44,000 in respect of profit sharing, national insurance, and the superannuation and pension fund. This was a very large expenditure, and he agreed that, up to a point, it was made on behalf of the employees, but he asked the stockholders to take it from him that this expenditure, which was something quite apart from wages, was one of the wisest the Board had made during the year. By reason of this expenditure the employees were assured while at work that they need not worry about what would happen to them if they became ill or met with an accident, because they would be provided for. There was a pension fund and a co-partnership fund. He himself had been a little astonished at the figures, but there was very good reason for the expenditure. At the end of the year 1928 the Company were employing 1843 persons, including staff and workmen; there were 1213 profit sharers, and 1504 on the pension fund. It might be asked why were not all the workers on the pension fund and in the profit-sharing scheme. It was a rule of the Company that when a man appeared likely to be a permanent employee it then became part of his obligation of service to join the pension fund, because then he would be working on level terms with his employers, and his future was being provided for.

With regard to profit-sharing, the Company were very jealous as to who they allowed to become profit-sharers, because once a man had joined the scheme he was looked upon as a permanent employee, and they were very particular that nobody should become a profit-sharer until they were sure that he was the right type of man to serve the Company in the future. He did not wish the stockholders to think that the expenditure of £44,000 he had mentioned was a capricious gift by the Board in order to curry favour with the men; it was nothing of the sort. It had been the endeavour of the Board for a very long time to make service to the Company something to be sought after, and, when obtained, held; it was the constant endeavour to instil into all that nothing but real intelligent service in the daily routine was of any use. They did not wish to become slave-drivers, but what they did try to insist upon was that the employees should render intelligent service, and while that service was being rendered the Company was providing for illness, accidents, old age, &c., so that the employees could concentrate on their work and need not worry about other things. The scheme was responded to very well. He, who knew the men, could not speak too highly of it. He knew, from discussion with them, that many shared his feelings—that it was very satisfactory, at the end of the day, to realize that one had done a day's work properly and intelligently. This was a matter to which the Board had paid the greatest attention, because in the running of an undertaking such as this, which was working continuously night and day, week in and week out, it was good to feel that most of the employees were taking a real live interest in it.

The amount placed to the special purposes fund was £11,514, which was the largest sum permitted by Parliament. The Board wanted this fund to be increased very largely to provide for the necessities of the future, things which could not be visualized to-day, but which might happen, as, for instance, the altering of the position of the works, and so on.

NEW CAPITAL.

An amount of £200,000 of 5 p.ct. debenture stock had been raised during the year, and it had been applied largely to decreasing the bank loan, investing money in the different funds, and to providing working capital. The raising of that money was a wise step. The investments in the Company's name, in respect of reserve fund, special purposes fund, and pension fund, which amounted to £79,000, had increased to nearly £109,000 at the end of 1928.

The stockholders would be interested to hear, he continued, that in 1928 their own ships had carried over a quarter of a million tons of coal, this being the largest amount they had ever carried in a year. Gas was being produced at the riverside works at Wandsworth on a larger scale than ever before, some of it by a new method—*i.e.*, by means of chamber ovens instead of retorts. These chamber ovens had been at work for eight months, and were fulfilling all expectations. At all the works as much use as possible was being made of waste heat, low-grade fuel (*i.e.*, breeze), and other things which in the old days were not looked upon as being very valuable. The value of some of the residuals was falling, and the markets for some of them did not look cheerful at the moment, but the Board were endeavouring to make up the loss in other ways, and he personally believed they would succeed.

There was a very large increase in the number of gas appliances used. Also, during the last two or three years the Company had been altering and bringing up to date their showrooms, of which there were five—at Epsom, Tooting, Wimbledon, Wandsworth, and Putney. The results had shown that they were attractive, more efficient, and were giving satisfaction to consumers.

Commenting on the trouble which had been experienced in the streets, not only in London, but in other places, the Chairman said he had had a good deal to do with gas and water supply for many years, and, speaking for himself, he was not unduly pessimistic as to the future in this respect. In all things accidents happened, of course, but he saw no reason to anticipate from recent events that, so far as this Company was concerned, there would be any more trouble in the future than there had been in the past. Every endeavour was made to ensure that appliances, both in and out of the works, were as safe as they could be.

RE-ORGANIZATION OF STAFF.

During the year there had been a re-organization of the staff. It had been found that there was a certain amount of overlapping of many of the departments, and the organization had been straightened out. In this respect the senior officers of the Company, not only the Secretary and the Chief Engineer and General Manager, but other senior officers as well, had been of the greatest help to him. They had fallen into line, and the departments were working together more closely than ever before. He was more than satisfied that the re-organization would be greatly to the advantage of the Company. These remarks applied more particularly, he said, to the dis-

trict work and the *liaison* between the Company and the consumers than to the works themselves.

The Board had appointed the Chief Engineer, Mr. C. M. Croft, who had had 18 years' experience, to the position of Chief Engineer and General Manager. It had been found advisable to have one centre where all the various matters could be dealt with before going to the Board. The Chairman also congratulated Mr. Croft (and he was sure the stockholders would wish to do so) on the fact that he had recently been made a Justice of the Peace for London, and had been elected to the Wandsworth Borough Council. He had topped the poll, and was a great success in that sphere. Mr. Croft had assumed these two new responsibilities only after he had given a very definite promise to his Chairman that in no way whatever would they interfere with his business as General Manager of the Company.

At this point, said the Chairman, he had to strike a rather sad note, for Mr. Chas. W. Braine, who had been Secretary of the Company for over 33 years, was retiring from that position at the end of March. He (the Chairman) had known Mr. Braine for 43 years. At the time his father, the late Chairman of the Company, had died, Mr. Braine was entitled to retire on pension, but at his (the Chairman's) earnest request, Mr. Braine had remained to help him and to see him established in the Chair. On behalf of himself and of the Company, the Chairman thanked Mr. Braine for all he had done. Though Mr. Braine would cease to be Secretary of the Company, arrangements had been made so that the Company could call upon his services when necessary, for there was no one who had anything like his knowledge of the Company's affairs, and those who knew him would appreciate that he would serve the Company in the same spirit as that in which he had served it for very many years.

A matter for congratulation was that the Company had been able to effect the re-organization of the staff without having to go outside its own personnel, and he was proud that this should be so.

The Chairman then moved the adoption of the report and accounts.

The motion was seconded by Mr. R. GARRAWAY RICE (Deputy-Chairman).

Mr. BERNARD HENNELL said that, though he was a ratepayer in the district of Wandsworth, he would like to see the public lighting of the district improved. He was not afraid of what might take place beneath the streets, for he could not remember any explosion in any part of the Company's area having occurred in his lifetime. Now that there was such a close alliance between the Company and the Borough Council, he hoped it would be possible to induce the latter to spend a little more money on street lighting in Wandsworth, in the interests of the people who walked the streets, and more particularly in the interests of those who motored. When the shops were closed—and the shopkeepers spent a good sum in excellent shop lighting—the public were left to the lighting as provided by the Borough Council, which was not sufficient. It did not reflect credit upon the Borough Council; nor did it give the Gas Company a chance to show what it could do in regard to public lighting. Referring to the expenditure in 1928 on the superannuation fund and on profit-sharing, he said this had increased by £4890. The amount of the Directors' and Auditors' fees had increased by £50. He did not know who had benefited, but he did feel that, in view of the hard work which the Directors must have done during the past year, in which there had been the re-organization of the staff, and when the demand for gas and the number of consumers had increased, it was surprising that there was not a substantial increase in the Directors' fees. The Directors ought to be thanked for the way in which they treated the stockholders in that respect. He quite agreed with the Chairman that it was a fine thing to have the employees of the Company enjoying their work. Incidentally, Mr. Hennell mentioned that two of the employees had asked him to act as their proxy at this meeting, and he regarded that as a compliment to the Board, and as indicating that those employees wished the Board to know that they supported it. This was the spirit which, he believed, permeated throughout all the departments of the Company.

The CHAIRMAN, replying, said there was no electric street lighting in the Borough of Wandsworth, which included Putney. The Company provided the lighting under contract, and, of course, the local authorities had to watch expenditure carefully. The Company did their very best to maintain the lamps properly, and keep them clean. He was in the district very frequently, and considered that from the point of view of cleanliness and upkeep, the lamps were as good as could be found anywhere. He believed he was right in saying that every lamp was looked at by an employee of the Company twice every night. The number of lamps and the cost of burners were matters for the local authority; but the Company would do what they could in regard to Mr. Hennell's suggestion. With regard to the slight increase in the amount of the Directors' and Auditors' fees, he said that this increase represented the amount the stockholders had voted to the Auditors last year. The Directors had had no increase for a very long time, and he assured the stockholders that they would not ask for an increase. He, for one, asked that his remuneration should not be increased.

The report and accounts were adopted.

DECLARATION OF DIVIDENDS.

The CHAIRMAN proposed that dividends for the half-year to Dec. 31, 1928, be declared, as follows (*less* income-tax): On the 5 p.ct. preference stock, 5 p.ct.; on the Wandsworth "A" stock, 9 p.ct.; on the Wandsworth "B" stock, 7½ p.ct.; on the Wandsworth "C" stock, £6 6s. p.ct.; on the Wimbledon stock, £7 2s. p.ct.; on the Epsom stock, £7 12s. 6d. p.ct.; and on the new ordinary stock, £6 6s. p.ct.—all rates per annum.

He added that this represented an increase of 10s. per annum as compared with last year on all stocks except the Wandsworth "C" stock, in which case the increase was 7s., in accordance with the sliding-scale.

The proposal was seconded by Mr. T. A. IVES HOWELL, and carried.

RE-ELECTION OF RETIRING DIRECTORS.

On the motion of the CHAIRMAN, seconded by Mr. G. F. PAGE, the retiring Directors, Messrs. Robert M. Chart and B. R. Green, were re-elected.

RE-ELECTION OF RETIRING AUDITOR.

On the proposal of Mr. J. C. POTTER, seconded by Mr. O. B. GREEN, Mr. H. Willis Smith was re-elected an Auditor.

This concluded the business of the annual general meeting.

SPECIAL GENERAL MEETING.

A Special General Meeting was then held to consider a Bill now being promoted by the Company in Parliament, to convert the existing capital of the Company, to make new provision as to the charges for gas and the application of profits, and for other purposes.

The SECRETARY (Mr. Chas. W. Braine) read the notice convening the meeting.

The CHAIRMAN, after expressing regret that Mr. A. J. Lees (of Messrs. Lees & Co., the Company's Parliamentary Agents) was unable to be present through illness, discussed the various clauses of the Bill. Dealing first with the clause concerning the conversion of stock, he said that, owing to the fact that the stocks of the Company at present consisted of so many classes, they were unwieldy, and the position was very unusual and very difficult. He had met people who owned stock in the Company, and who sometimes did not even know which class of stock they held. The existence of these many classes of stocks entailed upon the Board a great deal of extra work; and for some years they had been considering placing them all on one common basis. The Directors had arrived at certain figures which would ensure that when the stock was converted the stockholders would receive the same amount of dividend as they were receiving at present, assuming the selling price of gas and the amount of gas sold to be the same as now. In order to be sure, however, they had asked Messrs. Deloitte, Plender, Griffiths, & Co. (Chartered Accountants) also to work out the figures, so that each stockholder would get the same dividend under the new basic price and dividend system it was proposed to adopt as they were getting to-day under the sliding-scale system, on the basis of the same price of gas and the same quantity of gas sold; and those figures were in the Bill. In the past, if the price of gas increased or decreased, the dividends had altered, and they would continue to alter in the future if the Bill were passed; but there would be some change. Some stocks would lose a little less if the price of gas increased, and gain a little more if the price decreased. This basic price and dividend principle had been adopted by all the large London Companies years ago—the Gas Light and Coke Company, the South Metropolitan, the Commercial, the South Suburban, and others. A great advantage which was obtained under this system, and an advantage which Parliament had said was a fair one for such companies to have, was that, if there should arise an emergency such as that which had arisen between 1914 and 1918—or those which had arisen by reason of the coal strikes of 1921 and 1926, on which occasions the gas companies had to spend huge sums of money, and in consequence increase the price of gas out of all reason, through no fault of their own—the dividends would not fall to the extent to which they had fallen on those previous occasions. The stockholders would receive, if the Company could earn it, a minimum dividend of 5 p.ct. under all conditions. Someone whose opinion he valued very highly had stated that the effect of the passing of the Bill would be to place the Company's stock in quite a different category from that which it was in at present.

The amounts of the new stock which would be given in exchange for every £100 of the present stocks, if the stockholders and Parliament approved of the provisions of the Bill, were as follows: Wandsworth "A" stock, £129; Wandsworth "B" stock, £107 10s.; Wandsworth "C" stock, £90; New Ordinary stock, £90; Wimbledon stock, £105 10s.; and Epsom stock, £109.

There were in existence one or two different sorts of debenture stock, and all this would be converted into one 5 p.ct. debenture stock.

A clause was included in the Bill to provide that any fraction of £1 which remained over after the conversion of the old stock to the new consolidated stock would be returned in cash to the stockholder concerned. It was obvious that if, on conversion, an odd amount of (say) 3s. 6d. remained over, the Company could not issue stock to that amount to the stockholder.

Power was sought to raise as preference stock money which to-day the Company should raise as ordinary stock. Power was also sought to borrow to the extent of 50 p.ct. of the paid-up capital of the Company. Another clause provided for the priority of existing mortgages, and power was sought in regard to the payment of commission on sale of capital. This latter clause was an ordinary stock clause. At present the Company could do very little in the way of underwriting—perhaps this was not quite the proper word to use, but substantially it amounted to that—but would have power to do so under the clause, provided the amount of commission agreed to be paid should be disclosed in every prospectus.

Power was also sought to increase the special purposes fund. The Board had come to the conclusion that, in view of the alteration in the value of money and the cost of working, the fund which could be built up under the present law applying to the Company was not sufficient, and they were asking for power to double the amount normally placed in that fund annually.

There were the usual provisions with regard to calorific value; no alteration being made in this respect.

PRICE OF GAS AND APPLICATION OF PROFITS.

One of the chief parts of the Bill was that dealing with the price of gas and the application of profits, which concerned the substitution of the basic price and dividend system for the standard price and dividend system now in force. The proposals were in accordance with modern legislation, and the method of working was as follows: The number of therms sold was multiplied by the basic price which Parliament would allow, and in that way one arrived at

the revenue which would be obtained if gas had been sold at the basic price. It was hoped, of course, that the actual price would be a good deal lower than the basic price. One then proceeded to multiply the number of therms sold by the actual price charged for gas, and so arrived at the revenue derived from the sale of gas at that price. By subtracting the revenue which had actually been received from the revenue which would have been received had the gas been sold at the basic price, one arrived at the amount of the benefit the consumers had received by reason of the fact that gas was sold at a price less than the basic price; and that amount was called the consumers' share of the profits. The Company had always given something more than three-quarters to the consumers by way of reduction, and under the new scheme, £80 must be given to the consumers by way of reduction of price before £20 could be divided between the shareholders and employees. Under this new scheme, an amount equal to one-eighth of the amount of the consumers' share would go to the shareholders by way of increased dividend, and a similar amount would go to the employee co-partners as co-partnership bonus. Thus, of the total benefit, eight-tenths would go to the consumers, one-tenth to the shareholders, and one-tenth to the employee co-partners.

In the past there had been two partners in a gas undertaking—namely, the consumer and the shareholder. The Company wished to follow in the footsteps of those who believed in a third partner—*i.e.*, the employee—and the employee was very necessary to this partnership. The consumer wanted his gas as cheaply as he could get it; the shareholders wanted to sell it as cheaply as possible, because the cheaper it was sold the greater would be the amount they could distribute; the employee, as a partner, would also do all he could to keep the price of gas down, because by so doing he would have a bigger share. The scheme started with the assumption that the consumer would get gas at a moderate price, and the shareholders would get a return of 5 p.ct. on their capital, this being the basic dividend, and the workmen would get their ordinary wages. As the price of gas was reduced below the basic price, the shareholders and the employees would receive bonuses. If the Company continued to supply gas at 7·6d. per therm in Wandsworth, and at the present prices in the other parts of the area, the amount which would be received above the basic dividend of 5 p.ct. next year would make the dividend almost exactly the same as the shareholders were getting to-day, and the workmen, instead of getting a bonus of £23,400, as they had this year, would get £23,500 or £23,600. Further advantages would accrue if the price of gas were reduced.

PRICE OF GAS IN WIMBLEDON AND EPSOM AREAS.

The next clause of importance was that dealing with the price of gas in the Wimbledon and Epsom areas. Under existing provisions the Company must charge 1d. per therm more for gas sold in the Wimbledon area (the area of the old Mitcham and Wimbledon Company) than was charged in the Wandsworth area, and this state of affairs could not be altered except by Parliament or the Board of Trade, at the request of the Company. The price in Epsom must always be 2·2d. per therm more than that charged in the Wandsworth area. It was not proposed to alter the differential in Epsom, but the Company were asking to be allowed to charge an excess of only 0·6d. instead of 1d. in Wimbledon. When the Wandsworth Company, the Epsom Company, and the Mitcham and Wimbledon Company had amalgamated, the amounts of gas being sold by these companies could be represented by the figure of 120 for Wandsworth, 70 for Wimbledon, and 70 for Epsom. At present more gas was being sold in the Wimbledon than in the Wandsworth area. The Mitcham Works, however, were not making very much more gas than they were making in 1912, the time of the amalgamation, and the additional demands of the area were met by the Wandsworth Works. As there was always a fair partnership between the companies, it was felt that the differential applying to the Wimbledon area should be reduced.

INTERIM DIVIDENDS.

In regard to interim dividends, the Company were asking for something a little different from the powers asked for by other companies. In the case of the other basic price companies the shareholders were paid an interim dividend of half the basic dividend of 5 p.ct. (or whatever the basic dividend might be) for the first half-year, and the other half, together with the increases due, for the second half-year. The Wandsworth Company, however, were asking for power to pay, in the first half-year, half the actual dividend to which the shareholders would be entitled at the end of the year, and he believed they would be able to estimate it very closely.

Another clause to which the Chairman drew special attention was one giving the Directors power to appoint, as they thought fit, a person possessing special technical, commercial, financial, or scientific knowledge, as an additional Director, at the same remuneration as paid for the time being to the other Directors. This was a matter concerning very closely the relations between the shareholders and the Board, and he asked the shareholders to approve of the clause. At the time of the amalgamation, in 1912, there were ten, eleven, or twelve Directors, and there had never been a vacancy on the Board since. The Board did not ask to be allowed to appoint a new Director haphazard, but he urged quite earnestly that it was desirable for a Company to have new Directors occasionally. Times had changed and new methods had been adopted, and they felt that the time might come when they would consider it necessary to appoint a new Director—they had no one in sight at present. The new Director would not be a Director permanently, but he strongly recommended that the Board should be given that power. The Directors were anxious to maintain the traditions of the Company, and asked for power to do what they considered to be wise at any time in the future.

Among the other clauses of the Bill was one dealing with the validation of the existing pension fund, the effect of which would be to place the pension fund in a proper legal position. There were others concerning power to manufacture gas, and convert residual products on certain lands, relief from obligation to supply, charges for special meter readings, power to enter premises, prevention of the improper use of gas, and other general matters.

Summing up, he said that the proposed conversion of stock would render it much more marketable and a much more handy stock to hold. The Company were asking for a basic price, coupled with a 5 p.ct. minimum dividend, because they did not wish to see the dividends reduced to the extent they had been on past occasions through no fault of their own. They were asking for the application of the basic price and dividend system because they were sure that the partnership between consumer, stockholder, and workman was far better than a partnership merely between consumer and stockholder. The power to appoint an additional Director might not be used, but he was sure it was wise to have the authority.

The CHAIRMAN proposed a resolution expressing the stockholders' approval of the Bill.

Mr. B. R. GREEN, seconding, took the opportunity of expressing his thanks to the stockholders for having re-elected him a Director. The position, he said, was one of which he was very proud, and he would use every endeavour to serve the Company. The Bill he regarded as an extremely good one, and all the proposals in it he could very heartily and thoroughly support.

A STOCKHOLDER said he supposed the powers sought in the Bill were very much the same as those obtained by a great many other companies and accepted by them with satisfaction.

Mr. BERNARD HENNELL said he gathered that, though the holdings of the stockholders would be of the same value intrinsically, nominally the value would be reduced. Generally they were sold in quantities of round hundreds at present, and he asked if there would be an opportunity to square them up by the purchase of other stock.

The CHAIRMAN said that the odd amounts left over would be something less than £1 in each case. There was always a certain amount of stock held for the co-partnership fund, and he gathered that if, for instance, an amount of 19s. 6d. were due to be returned to any stockholder, that stockholder would probably be asked for sixpence and would be given another £1 worth of stock.

Mr. HENNELL said that in the case of the Wandsworth "C" stock, for instance, the nominal value of the new issue would be £90 instead of £100. In the past stockholders had not been able to buy £10 worth of stock, but he gathered they would be able to in the future.

The CHAIRMAN replied that one would be able to buy stock to the value of £1.

Mr. E. L. BURTON congratulated the Chairman on his very able exposition of the terms of the Bill, and said he believed the stockholders would be able later on to congratulate him and his colleagues upon the very great advantages they had secured to the Company. He stressed the value of the "triple alliance" of proprietors, consumers, and workers, and said that all three could be looked upon as doing their best—the consumer in consuming more gas and so bringing about a reduction in price, the proprietors in urging the Directors forward (though they apparently needed no driving), and the workmen as tripartite contributors would all do their best. He was glad that it was proposed to reduce the amount of the differential applying to the Wimbledon area. The time had come when the whole question of differential charges might be re-considered. Finally, he congratulated the Chairman and the Directors upon their efforts, and hoped they would meet with success in Parliament.

The CHAIRMAN, replying to the first speaker, said that, speaking generally, the powers sought in the Bill were similar to those obtained by other companies.

The resolution of approval was carried.

VOTE OF THANKS TO THE STAFF.

The CHAIRMAN proposed a vote of thanks to the staff for their splendid efforts on behalf of the Company. In this connection he mentioned that the workmen employed by the Company owned nearly £100,000 of its stock, and, therefore, he was more than justified in urging the stockholders to approve of the scheme for bringing the employees into co-partnership. No Company had a more loyal staff than this, and the great majority of them were out to make the name of the Company mean something. He was anxious that the whole of the employees, from top to bottom, should know that the proprietors had confidence in them, and thanked them for all they had done.

Mr. HENNELL seconded, and at the same time expressed the very best wishes to Mr. Braine (the Secretary) in his retirement. All the stockholders, he said, hoped he would live many years to enjoy his retirement. He also paid a tribute to Mr. Croft, the Chief Engineer and General Manager.

The vote of thanks was accorded with acclamation.

Mr. BRAINE and Mr. CROFT responded to the vote of thanks, and the meeting closed.

GAS REGULATION ACT APPLICATIONS.

SPECIAL ORDERS.

Bideford Gas and Coke Company, Ltd.

To extend the limits of supply so as to include a portion specified of the urban district of Northam, to make provisions for the raising of further capital, &c.

Oxford Gaslight and Coke Company.

To change the name of the Company, to empower the Company to acquire the Abingdon Gaslight and Coke Company, Ltd., to extend the limits of supply, to raise further capital, &c.

Prescot Gas Company.

To change the name of the Company, to empower the Company to purchase the Rainhill Gas Company, to extend the limits of supply, to acquire additional land, to erect showrooms, to raise additional capital, &c.

Sutton Gas Company.

To authorize the Company to utilize scheduled lands for gas purposes, to empower them to raise additional capital, and to confer certain other powers.

SOUTH SUBURBAN GAS COMPANY.

Annual Meeting.

The Annual Ordinary Meeting of the proprietors of the South Suburban Gas Company was held at the Cannon Street Hotel, E.C., on Friday, Feb. 15—Dr. CHARLES CARPENTER (Chairman of the Company) presiding.

Mr. WILFRID WASTELL (Commercial Manager and Secretary) read the notice convening the meeting.

The minutes of the previous meeting were taken as read, and the Chairman sealed the register of proprietors.

The CHAIRMAN, proposing the adoption of the Directors' Report and the Accounts for the year 1928, said: Ladies and gentlemen,—When the month of January comes round, you will not be surprised that there also comes with it feelings of expectancy as to how the year's working has turned out, because, though we keep a running account of our progress, we cannot, until stock-taking and the making-up of our figures for the consumption of gas, make an accurate guess as to the position. The accounts and report which are in the hands of all of you, and which having thus been circulated, I assume you will take as read, will have reassured you upon the matter. Despite the unfavourable weather (I mean from a gas-maker's point of view) prevalent during the latter part of the year, we have had a—shall I say—comforting increase of business, and a satisfying addition to the number of our consumers. Few homes would be considered completely furnished to-day without a gas supply; and the service pipe and meter having been installed, it is our business to make the use of gas an attractive proposition.

LOW PRICE OF GAS.

Now the all-important means of achieving this result is through the medium of a low price for gas, and that is why, in my opinion, the first matter for congratulation in reviewing our figures for 1928 is that we have brought our price down to 9d. per therm. The price of coal is an important factor in this, but a greater one is the cost of labour. We need and employ more than our competitors primarily because the foundation of our business is to use the raw material which this country itself provides, and instead of wasting its bye-products or causing nuisance by blowing them into the atmosphere, utilize them for the general good.

The increase in our gas consumption—namely, 3¼ p.ct.—is, in the circumstances, a satisfactory one; we could not expect it to be fully proportionate to that of the increase in the number of our consumers—namely, 4¼ p.ct., bringing their total to 110,343. Apart from this, and as some indication of the popularity of gas-using apparatus, I may mention that we continue to have a considerable demand for these articles which it is our practice to sell outright or to let on hire or hire-purchase as the case may be.

The most economic, I think I may say, both from our point of view and from the point of view of our consumers, is to sell outright, because we do find that those who buy apparatus normally take more care of it than those who have apparatus, such as a cooker or any other, hired from the Company. These latter have before their minds the fact that the apparatus does not belong to them, that they pay the hire charges, and can use the apparatus as they like. We do welcome, therefore, the purchase of gas apparatus outright by the consumers.

LAST OF THE SLIDING-SCALE.

The year under review sees the last of the sliding-scale which broke down so hopelessly and operated so unfairly during the war. You are not likely to forget that, under it, our dividend authorized by the Act which put it into operation fell to 1s. 8d. per £100 of stock, and how we were by a Special Act of Parliament allowed to add to this the totally inadequate figure of £3 13s. 4d. Our new arrangement provides, as you are aware, for a basic rate of 5 p.ct., *plus* such additions as we may earn as the result of good working.

In accordance with the agreement made with our neighbour, we are now taking gas regularly from them. This will avoid any capital outlay upon carbonizing plant, and will prove in more ways than one a particular advantage to this Company. The reason for this is that our future extensions of business must be over a wide and straggling area, which necessarily costs more to pipe and supply than a densely packed one. Our future capital requirements may then, broadly speaking, be considered as confined to outdoor apparatus—pipes, meters, stoves, &c.

GREATER PREPAYMENT CONSUMPTIONS.

It is curious that our average consumptions of gas per consumer remain fairly constant. Our business as a whole shows an unvarying increase year by year, but it is significant that the slot consumer is yearly increasing his average consumption, while that of the ordinary consumer moves in the opposite direction. I have told you of our sales of gas apparatus, and I am sure you will consider the quantities interesting: Over 2600 cookers, 1200 fires, 550 coppers and boilers, 930 bath heaters, and a host of smaller appurtenances such as boiling rings, irons, and fixtures. These figures are exclusive of the number of appliances let on hire. You can imagine with such a potentiality of gas-using appliances as is thus indicated, weather such as we are now having must have put a great strain upon our gas-producing resources. This has indeed been the case; and yesterday we sent out a quantity of gas, in volume, half as much again as was being taken this time last year. It is, of course, the greatly increased use of gas heating appliances which gives rise to these wider variations under climatic changes. We never felt similar strains to this when we were purely lighting purveyors; but fortunately our storage arrangements place us in a position to deal with such fluctuations which our competitors must envy. We are told that the serious breakdown of electricity supply in Beckenham a day or two ago arose from the strain put upon the cable by those who were endeavouring to use the energy for heating purposes. We have here again the great advantage of association with our neighbour, from whom we have been drawing increased supplies under these conditions of exceptional demand.

As regards our purchase of the Northfleet Company, I shall deal with this at the Extraordinary Meeting which follows the present one. Nor do I think I need trouble you much to-day with the matter referred to in paragraph six of the report. I explained the Bill very fully about this time last year, and it finally went through substantially in the form in which it was presented. As I have already said, you are assured by it of 5 p.ct. for the use of your capital, *plus* one-eighth share of such additional profit as may be made under its provisions. At the same time the co-partnership principle which we were the second Company in the United Kingdom to adopt, nearly forty years ago, has been made a statutory one, and our co-partners will now be equally entitled with you to their share of additional profit.

SUCCESSFUL CAPITAL ISSUE.

I am glad to be able to report that we successfully eased our capital position by the issue we made last October. The prices realized by this issue—namely, £107 9s. 9d. in the case of the ordinary stock—is a good indication of the favour with which it is regarded.

Dealing for a few minutes with our technical results, I am pleased to say these have shown a substantial improvement upon those of past years. Our yield of gas per ton of coal is 2½ therms higher, and is now 73 therms per ton. We are busy installing plant for the extraction of naphthalene by oil washing, which will relieve not only our outdoor staff of much anxiety, but our consumers of difficulties they so frequently experience from the presence in their service pipe of this elusive, though highly illuminating, hydrocarbon.

The method we have adopted is one that has been very fully tried out elsewhere, and we are pushing on as fast as possible with its installation. It seems curious that we should have to take out from the gas one of the richest hydrocarbons produced in the decomposition of coal. The reason is that it cannot be trusted to travel forward with its neighbouring hydrocarbons and reach the consumers' burners. Its habit is to drop down in all sorts of unexpected and awkward places. The only remedy is to take it out of the gas before it is distributed; and that operation the new plant will carry out.

IMPROVED COKE-GRADING PLANT.

We have also improved our coke-grading plant. Coke as it is withdrawn from the retort house is not in a suitable condition to meet modern demands and modern requirements. It has to be screened and sized very carefully. The successful use of coke depends, I think, primarily upon the amount of ash being as low as possible, and that is a factor of the quantity that comes in with the original coal. It should also be sent to the consumer in as dry a condition as possible; and I am afraid that sufficient attention has not been given to this matter in the past. It is to-day realized generally, however—and your Engineer was one of the first to realize the importance of it—that the coke should retain the smallest possible residue of water after quenching. The trouble arises from the fact that the coke is withdrawn from the retorts in the red-hot condition, and has to be cooled rapidly, so that it does not continue to burn and give trouble when it stands. The problem is to apply just the quantity of water that will cool every particle of coke and yet not leave a surplus of water in the pores of the coke itself. By the coke-grading plant 45 p.ct. of our coke sales was sized during the year.

We have also laid a 4-mile pumping main to Cray, which has greatly relieved our high-pressure distributing pumps. We are also experimenting in one of our outlying areas with a new method of storing gas locally under pressure; and this should help us in one of our constantly recurring difficulties—namely, that of meeting the peak requirements of the Sunday cooking load.

We have a straggling area now, for we are something more than a suburban company. We have our mains running over a large part of Kent, and the area is not by any means closely packed with houses. One comes from a village here and a village there. The problem of supply in those circumstances is a difficult one; and one of the difficulties arises from the particular nature of the load. On Sunday mornings between (say) 11 and 1 o'clock, there is a very big peak, and after that the demand drops off again. The problem is to supply that peak economically. If we rely wholly upon sending the gas direct from the works, we have to have mains of such capacity having in view the pressures which are possible, as will transmit sufficient gas to meet the peak demand. The alternative is to have local storage; and the particular local storage which we are now trying at Welling is to use steel tanks or reservoirs, into which the gas is pumped under high pressure. This high-pressure gas is let off automatically when the heavy demand is such as to cause a reduction of our normal pressure on the mains. It is a very simple means, in special circumstances, of overcoming the difficulties with regard to this peak load.

Finally, I ought to say that we are not forgetting the recreational side of our staff's association with us, for we have laid out at Worsley Bridge Road a ground suitable for our co-partners to indulge, during their spare time, in football and cricket. The general conduct of the staff has been excellent, and to both the engineering side, which has done so much to bring our working results to a higher standard,

and the outdoor department, entrusted with the duties of gas selling under very varying conditions of demand, great praise is due.

I now beg to move:

> That the report of the Directors and the accounts examined and signed by the Auditors be received, adopted, and the report entered on the minutes.

Mr. BENJAMIN R. GREEN (Deputy-Chairman), seconding the resolution, said he was sure the shareholders would wish him to say how very much they had enjoyed listening to the Chairman's address. In placing the affairs of the Company before them, the Chairman had given them a picture covering the activities of the Company for the past year as well as its future prospects; and they had found the address of absorbing interest.

Discussion having been invited,

Mr. H. K. SCOTT said that he, and perhaps others, were interested in low-temperature carbonization; and he asked if the Chairman could give some indication as to what the effect of this process would be upon companies such as this. It was a matter which was very much in the public eye, and he personally did not understand what would be its effect upon already constituted companies. Was there any possibility that some of these independent companies who were trying out different plants would in any way compete with an organization of this kind? With regard to the question of storage of gas at high pressure, he said he lived in a district in which a small gas company operated; and this matter was one of the serious difficulties attaching to gas undertakings to-day. Electricity was forcing its way into people's houses, with a certain amount of help from the Government; and he had found that everywhere there was dissatisfaction regarding the supply of gas, particularly on Sundays, when people wished to have hot dinners. He wished to say, however, how pleased he was to know that there was some simple manner of overcoming that difficulty, and to express the hope that what was being done by the South Suburban Gas Company might be generally adopted, in the general interests of the gas industry. He was sure the shareholders felt that in the Chairman they had someone who really understood the business very thoroughly, and who gave them every year information which enabled them to go away from the meeting happy.

The CHAIRMAN, replying, assured the meeting, in the first place, that every official of the Company, whether he was concerned with the manufacture or the distribution side, realized the obligation to supply completely and fully every requirement that might be made for gas throughout the district, and at every time of the day. The Company's obligation was to give service, no matter at what cost—and with the use of gas for cooking the fulfilment of that obligation was costly. In order to fulfil that obligation there had been provided throughout the district a system for recording automatically the pressure of gas. This was not needed, of course, in places where the pressure was certain to be maintained to its fullest extent; but sometimes, as a district developed, unexpected demands arose, due to the increase in the number of houses. He could conceive of no greater cause for dissatisfaction than that there should be insufficient pressure. The average man in the Company's area was employed in London during the week. When he went to his office he left his household troubles behind, but what worse advertisement for gas could there be than that on the very day of the week on which he was at home, and wanted a hot dinner with his family, there should be insufficient pressure. The Company were fully conversant with all the difficulties, and had a complete set of machinery to deal with them; it was their settled and certain policy to do whatever was required to meet them.

With regard to low-temperature carbonization, he said there was no doubt whatever—and he did not think there had been any doubt for many years—that there were various methods of distilling or carbonizing coal at low temperature and producing a fuel which was free from the disadvantages of raw coal, and which was not subject to the disadvantages pertaining to ordinary coke. The problem had always been as to how these processes could be made economical. About twenty-one years ago he had first examined the technical possibilities of the best-known process of all—that produced by the late Thomas Parker. He had inspected all the plants; Mr. Parker had shown him all his experiments, and he had gained the definite opinion that there was no uncertainty with regard to carbonizing coal at low temperatures—at that time he had in mind certain coal. Whether the process was an economic one, and whether the public would give the necessary prices for the resultant fuel to make it pay, were matters about which at that time he was unable to obtain sufficient assurance. To-day, however, there was a more positive attitude with regard to smoke prevention. He believed the individual was more alive to the importance of eliminating smoke from large cities, and was taking a more intelligent interest in the matter. The South Metropolitan Company had decided to make some large-scale experiments. In these matters gas undertakings very frequently suffered from one handicap; generally speaking it was they themselves who had to make the investigations and bear the brunt of the experimenting, and the cost. That was not true in respect of the particular low-temperture process to which he had referred, however, because in the last 20 or 21 years enormous sums had been spent in developing and investigating it; but in a general way the gas undertakings had to meet the cost of their own research, and it would be understood, therefore, that it was only the large companies that could afford to do so. Low-temperature carbonization, as an economic problem, and associated with the supply of gas, had not yet been tried out, but that was what the South Metropolitan Company had set themselves to do, A Company of the size of the South Suburban Gas Company could not afford to, but it would benefit by the general knowledge and general experience which would arise from the South Metropolitan Company's investigations. He believed Mr. Scott, when raising this question, had in his mind a very important aspect of the problem—namely, that if low-temperature carbonization became a commercial proposition, and there arose a general demand for the fuel produced by that process, then it was undoubtedly the gas companies who should add to, or vary, their plants in order that they might be the providers of it. It would be very unfortunate if it should happen that the advantages of low-temperature fuel should make it pre-eminent, and that at the same time the gas companies should not be sympathetic with its production. They had plant for the carbonizing of coal, they had apparatus and methods for dealing with and handling the liquid, and, of course, the gaseous products; therefore, it behoves them to thresh out thoroughly this problem of low-temperature carbonization, in order that they should know exactly how they stood, not only from the general point of view as purveyors of gas, but in their own interests also.

There being no further discussion of the report and accounts, the motion for their adoption was put to the meeting and carried.

DIVIDENDS.

The CHAIRMAN moved the following resolution:

> That a dividend for the half-year ended Dec. 31 last be now declared at the following rate per annum: 6½ p.ct. on the ordinary stock, *less* income-tax; and that warrants for the net amounts be forwarded on March 1 to the registered addresses of the proprietors.

Mr. BENJAMIN R. GREEN (Deputy-Chairman) seconded, and the resolution was carried.

PURCHASE OF THE NORTHFLEET AND GREENHITHE COMPANY.

The CHAIRMAN moved:

> That the agreement dated Nov. 14, 1928, and made between the Northfleet and Greenhithe Gas Company, Ltd., and the Company for the purchase by the Company of the undertaking of the Northfleet and Greenhithe Gas Company, Ltd., be and is hereby approved.

Mr. BENJAMIN R. GREEN (Deputy-Chairman) seconded, and the motion was carried.

RE-ELECTION OF DIRECTORS.

Mr. HAROLD GUNDRY moved that Mr. Frank Bush and Mr. Arthur Matthews Paddon, the outgoing Directors, be re-elected Directors of the Company. Both these gentlemen, he said, had joined the Board about 18 months ago, and had placed their great experience and skill at the service of the Company. Both were so very well known inside and outside the gas business that they needed no recommendation from him.

Mr. FRANK JONES seconded.

The resolution was carried.

Mr. FRANK BUSH, expressing thanks for his re-election, said that he would endeavour to watch the interests of the shareholders to the best of his ability.

Mr. A. M. PADDON also expressed thanks.

INCREASED DIRECTORS' FEES.

The CHAIRMAN, proposing a resolution to increase the emoluments of the Board, said he felt sure the shareholders would agree with him that this was overdue when he reminded them that it had not been considered since this time sixteen years ago. That was a long period in the history of the Company, and it gave cogency to the suggestion more than would any words. At that time the Company were selling roughly 10 million therms of gas per annum; to-day they were selling more than 18 million therms per annum. The proposal was:

> That the Directors' fees, as and in the manner now paid, are hereby increased by the sum of £1000 per annum, allocated in such proportion between the Chairman, the Vice-Chairman, and the Ordinary Directors as the Board may determine.

The figure settled in 1913, he said, was £3500, and the figure which he was asking the shareholders to increase it to was £4500.

Mr. BENJAMIN R. GREEN seconded.

There was no response to the Chairman's invitation of discussion or amendment; and the resolution was carried.

RE-ELECTION OF AUDITOR.

On the motion of Mr. J. H. BORASTON, seconded by Mr. W. J. LIBERTY, the meeting re-elected Mr. Ernest D. Davey an Auditor of the Company.

EXTRAORDINARY GENERAL MEETING.

An Extraordinary General Meeting of the proprietors of the Company was then held to consider the provisions of the Bill promoted in Parliament to provide for the transfer to the South Suburban Gas Company of the undertaking of the Northfleet and Greenhithe Gas Company, Ltd., to extend the limits of the South Suburban Company, and for other purposes.

The CHAIRMAN: The resolution I have to propose is as follows:

> That the Bill now before Parliament, intituled:
>
> > A Bill to provide for the transfer to the South Suburban Gas Company of the undertaking of the Northfleet and Greenhithe Gas Company, Ltd.; to extend the limits of the South Suburban Gas Company for the supply of gas; and for other purposes,
>
> be and the same is hereby approved, subject to such alterations as Parliament may make therein, and the Directors may approve.

I am afraid you will think we have gone about this in a roundabout way. The first thing that had to be done was for you, as proprietors, to approve of the agreement we had entered into with the Northfleet and Greenhithe Company. In order to carry that out—and it is one indication of the disadvantages and inconveniences (and, I must add, the expenses) to which gas undertakings are put under the present system of legislation—a Bill has to be promoted in Parliament.

I will indicate briefly the provisions of the Bill. Its Preamble

recites the status of the Company and of the Northfleet and Greenhithe Company, which is a limited liability Company; and it recites the fact that we have entered into an agreement. The Bill incorporates the general Acts to apply to the new undertaking, and interprets various expressions used. Clause 4 re-defines a portion of one of the districts taken over, with regard to the boundaries of which there was a little uncertainty. Clause 5 gives the details of the prices to be charged in the new area taken over. Clause 6 confirms the agreement which has been entered into, and which you were good enough to approve without hearing all the details; and I am very pleased to record the confidence you have in the Board. The sale of the undertaking is to be by deed. Clause 7 deals with the date of taking-over the debentures, the payment of interest, and the option of paying them off. Clause 8 provides that any actions going on now are not to be abated by reason of the new arrangement. Clause 9, that any contracts the Northfleet and Greenhithe Company have entered into are to be binding on the Company. Clause 10, that all books and documents are to be received as evidence in any matter as may be required. Clause 11 deals with the apportionment of receipts before and after transfer, and Clause 12 repeals the Board of Trade Orders under which the Northfleet and Greenhithe Company are at present carrying on their business. Clause 13 provides that the Northfleet and Greenhithe Company, after the joining up, shall continue only for such time as is necessary to wind up their affairs. A subsection assigns to the holders of stock in the Northfleet and Greenhithe Company the sum of £18 in respect of £10 of the 10 p.ct. ordinary stock, and so on in proportion, and the sum of £12 for each £10 of the 7 p.ct. ordinary stock, and so on in proportion. The Directors of the Northfleet and Greenhithe Company shall continue to hold office, without re-election being necessary, until they wind up the Company's affairs. If any vacancy occurs during that period, they shall have the power to fill it; and upon the completion of the arrangements the Northfleet and Greenhithe Company is to be dissolved. Clause 14 defines the area of Swanscombe, which I mentioned earlier. Clause 15 provides that the South Suburban Company shall have power to apply capital for any of the general purposes of the undertaking to which capital is properly applicable.

Other clauses provide that a copy of the Act has to be registered with the Registrar of Joint Stock Companies, and that all costs, charges, and expenses of and incidental to the Act are chargeable to the Company, and may be charged against revenue.

The Schedule to the Bill contains the agreement which sets out the details of the purchase. The all-important clause is:

> That the Northfleet Company shall sell, and the South Suburban Company shall purchase, at the price of £44,865, the undertaking of the Northfleet Company as a going concern freed and discharged from all incumbrances and liabilities other than the said debenture debt of £7500.

Then the agreement defines how it is to be construed. The undertaking includes lands, wayleaves, buildings, and the rest. Machinery is provided for the proper transfer of the undertaking. You must assume that we have gone into this very carefully and fully, and that the agreement we entered into provisionally, and subject to the approval which you have given, is in the interests of our Company. It is a much more difficult thing to-day than formerly for a small undertaking to continue to function. It is up against much greater difficulties; and I think there is no doubt that small gas undertakings will in the future come very largely into the hands of the larger organizations. There are two methods of doing this. The small companies can be taken over, as the Northfleet and Greenhithe Company will be under the terms of this agreement, or there can be association between two undertakings. In the present case there is no doubt whatever that the proper policy is to take over the Northfleet and Greenhithe undertaking. Its district adjoins ours at Dartford. We shall dismantle its works; we may perhaps use the holders for the storage of gas; we shall have to lay a short length of main connecting two works; and we shall dispose of the property leasehold under very favourable terms—there is a long lease—in due course when the works are dismantled. The advantage to us is a tangible one, and it continues the task on which we engaged some years ago, when we ceased to be merely a suburban company, because we are extending our mains much more widely than was originally contemplated.

Mr. BENJAMIN R. GREEN (Deputy-Chairman) seconded the resolution. There was no discussion, and the resolution was carried.

VOTE OF THANKS TO THE STAFF.

The CHAIRMAN, proposing a resolution of thanks to the staff, said it was one which always met with the shareholders' approval. The demands made upon the officials engaged in the technical and commercial activites of gas undertakings were increasing year by year; their duties were becoming more complicated, and certainly more onerous; and if ever the officials of gas companies needed the encouragement which the shareholders could give them, they needed it to-day. Especially was this the case in circumstanes of severe weather conditions, such as those obtaining that day, when there was a very much increased demand, and when the whole staff was called upon to do extra work.

Mr. A. MORLAND seconded, and the resolution was carried.

Mr. JOHN TERRACE (Chief Engineer), responding, said it was the endeavour of the whole of his staff to do everything they could for the good of the Company. They did it in a very friendly, co-operative spirit, and appreciated the vote of thanks accorded by the shareholders.

Mr. WILFRID WASTELL (Commercial Manager and Secretary), on behalf of the commercial staff, associated himself with the remarks of Mr. Terrace, and assured the shareholders that it was only because they knew they had the support of the Directors and the encouragement of the Chairman particularly behind them that they were able to work on day by day with the one object of increasing the Company's business.

VOTE OF THANKS TO THE DIRECTORS.

Mr. W. J. LIBERTY proposed a hearty vote of thanks to the Chairman and the Directors for their services. The year just passed had not been an easy one for them, he said, judging from what the shareholders had heard, especially at the extraordinary general meeting. They had had to work very hard in connection with the negotiations with the Northfleet and Greenhithe Company. The resolution which had been passed to increase the Directors' fees would be fully justified when the Bill now before Parliament became an Act, because the area of supply would be increased and their labours extended. The shareholders were gratified that two such gentlemen as Mr. Paddon, who was known throughout the gas industry, and Mr. Bush, who was also known to many of them for years, were serving on the Board. Incidentally, he said it gave him great satisfaction to notice the streets in London illuminated by high-pressure gas lamps which had stood since 1911, in spite of fierce competition.

Mr. H. K. SCOTT seconded, and the vote of thanks was carried.

The CHAIRMAN, in a brief response, said that he and his colleagues were very grateful for the sympathy and confidence expressed by the shareholders.

The meeting then closed.

CROYDON GAS COMPANY.

Annual General Meeting.

The Annual Ordinary General Meeting of the Croydon Gas Company was held at the Company's Offices, Katharine Street, Croydon, on Friday, Feb. 15, 1929—Mr. WILLIAM CASH, J.P., F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. Frank F. Wood) read the notice convening the meeting, and the minutes of the annual general meeting held on Feb. 24, 1928; and the Directors' report and statement of accounts for the year ended Dec. 31, 1928, were taken as read.

The CHAIRMAN, proposing the adoption of the report and accounts, said he could not help thinking that the fact that the attendance was somewhat smaller than usual was not wholly due to the severe weather, but was due partly to the fact that the report was a very satisfactory one.

INCREASED SALES.

Dealing with the accounts, he said that the first salient feature which emerged from an examination of the revenue account was that the gas receipts for the year represented a very large decrease—of nearly £66,000—as compared with the previous year. That decrease was due, of course, to the fact that the Company had reduced the price of gas in Croydon as from Lady Day, 1928, from 9·6d. to 9·4d. per therm, and in Caterham from 10d. to 9·8d. per therm. Again, at Christmas, 1928, it was decided to reduce the price further and abolish the differential charge at Caterham, the present price being 9·2d. per therm both in Croydon and Caterham. At the same time, there was an increase in the quantity of gas sold during the year of 1·8 p.ct., and the relative quantity to which that corresponded was about 48 million c.ft. This was not an unsubstantial increase; and, having regard to the fact that the summer of 1928 was particularly warm and mild as compared with the summer of 1927, and also that in 1927 some advantage had accrued to the Company from the aftermath of the coal strike of 1926, the Directors regarded that state of affairs as not unsatisfactory. Compared with other undertakings in the neighbourhood, in London, and on the south coast, the Croydon Company had done relatively about as well as they had.

RENTALS AND RESIDUALS.

Another satisfactory feature concerned rentals received from stoves and meters, which had increased by £2832. On the other hand, there was a reduction of a little over £35,000 in the receipts from the sale of residuals. That was one of the matters which the Company could not control completely. It was a well-known fact that the prices of residuals, and particularly the price of coke, followed the price of coal, and a fall in the price of coke, therefore, was not to be wondered at when one looked to the other side of the account and saw what a substantial decrease had been effected in the coal bill. The figure showed that there was a saving of £107,550 as compared with 1927, but allowance must be made, of course, for the fact that in 1927 there was some burden arising from the coal strike. On the other hand, for reasons he would refer to later, the cost of repair and maintenance of works had increased by £19,500, but the cost of repair of mains was reduced to a small extent—£1660.

SALE OF FITTINGS.

The Chairman drew attention to an item which appeared on the credit side of the account for the first time, under the heading "sale of fittings." This showed there was a gross profit of £10,280, and the figure was arrived at after charging certain direct expenditure in connection with showrooms; this had some effect in the sense that the allocations on the debit side of the account had been somewhat

altered, particularly, for instance, in respect of distribution salaries and repairs of mains.

These were the salient features of the revenue account, and inasmuch as the corresponding figures for 1927 were given in the account for purposes of comparison, he need not deal with it in greater detail. A small expenditure to which he ought to draw attention, however, and which was included in the general charges, was a donation made on behalf of the Company, of 200 guineas, to the Miners' Distress Fund. He was sure the shareholders would agree that a Company such as this, which was largely interested in the coal market, quite properly should contribute something to that very deserving fund.

SHOWROOM POLICY.

Dealing with the general policy in reference to showrooms, he said the Company had the building in Katharine Street, and had recently completed very fine showrooms at Purley. They were engaged also in completing a new showroom at Caterham, to take the place of the small and inadequate building occupied earlier. Also, a new showroom was being provided at Thornton Heath, to cope with the development in that part of the area, and the building of a showroom with workshops attached had been commenced at Wallington. There had been a demand for the provision of such facilities there; an enormous expansion of building was taking place in that part of the area, and the Company had been trying to provide adequate showrooms with workshops to deal with the business. Further, the Directors had practically completed negotiations for the acquisition of another building in the centre of the area, where it was hoped to instal stove and meter shops, at which would be undertaken the repair, cleaning, and enamelling of the apparatus sent out, and also the testing of that apparatus carefully before it was delivered to consumers. There would be sufficient land there, if the Company obtained that building, to develop it for a central garage and also for central stores. The fitting shops at Waddon were quite inadequate to cope with existing business, which was growing very rapidly, and the time had come when the Company must make a move in that direction. The situation of the property it was hoped to acquire was central, and it had railway accommodation. He was unable to say precisely where it was, because nothing had been actually signed and stamped, though the terms of the agreement to acquire had been settled. The Company were providing these facilities for dealing with apparatus in order to be able to give to consumers consistent good service, so that they might be satisfied and could be provided with the best types of appliances. During the last year there had been put in, on hire or sale, 8987 new pieces of apparatus in the shape of geysers, fires, heaters, and so forth. There were 3310 new consumers during the year, making the total to date 70,371. The number of new points installed in various buildings for builders was 16,623, so that it would be appreciated that the fitting and distribution departments had been very well occupied during the last year.

Having heard what had been done, the shareholders might like to know what the effect of it was. He was happy to be able to say that the Company's officers were continually showing him letters from consumers, expressing satisfaction with the way in which the work was carried out. He mentioned that fact in justice to the General Manager and those working under him, to show that their efforts were appreciated, and that they bore most excellent fruit.

WORKS EXTENSIONS.

With regard to the works, the growth of the business had necessitated expenditure there. There had been installed a new carburetted water gas plant during last year, capable of making 3 million c.ft. of gas per day, with the ancillary washing and purifying plant, all designed on the very latest model, and largely automatic in operation. The Directors had been very thankful that this had been available during the last few days, to assist in meeting the very heavy demands due to the exceptionally cold weather. They were installing new stoking machinery, driven by electricity, to replace old machines which had been at work for 24 years, and were engaged also in erecting a complete set of intermittent vertical retorts having a capacity of 3½ million c.ft. per day. These would have new coke hoppers and plant ancillary to them, and were being erected on the site of part of one of the old horizontal retort houses. After exhaustive inquiries, both at home and abroad, the Directors had adopted the type of plant which the Company's Engineer had advised them to adopt, and which would give better results than those of the plant which had been superseded. The new plant was very much larger than the plant that was pulled down—plant with a capacity of 3½ million c.ft. per day was replacing plant with a capacity of about 1 million c.ft. per day—but, inasmuch as it was to an extent renewal, a considerable proportion of the cost would be borne by revenue. This was what he had referred to when he had said that the cost of repairs and maintenance of plant in 1928 was considerably more than it was a year previously.

With regard to capital account, which showed the capital spent during the year, he said the items included the cost of properties acquired at Wallington, Caterham, and Thornton Heath, and also the cost of a small house built at Waddon which was to be occupied by one of the assistants to the Engineer. That assistant would be living, therefore, in close proximity to the works. The items in the capital account also included charges in respect of the new plant to which he had referred. The expenditure on mains covered the cost of new mains, of a total length of about 15 miles, which were laid during 1928. The charge for meters, of course, was in respect of new consumers.

In the renewal fund account there was a small charge in respect of certain retort renewals carried out during the year.

RESEARCH WORK.

Leaving for a moment the affairs of the Croydon Gas Company in particular, he said it would be realized, from his statements, what an enormous expansion was going on in the gas industry generally. In this connection he wished to express appreciation of what had been done by others on behalf of the industry. In gas-works both in London and elsewhere throughout the country experiments were being conducted with regard to carbonization, assisted by special investigations by the Institution of Gas Engineers; and the Government's Fuel Research Board was also dealing with questions of this character. Such matters as carbonization, the testing of coal, heat conservation, and particularly a method which had been taken up at Croydon—*i.e.*, heat conservation by means of waste-heat boilers, with consequent saving in expenditure both as regards labour and material—were being dealt with. Further research was being conducted in regard to the measuring of gas in improved meters and calorimeters, and in regard to the improved transmission of gas, a matter which had been under investigation for some years, and in connection with which they were benefiting by what had been done abroad, particularly in Germany. There was also improvement in the residuals produced—improvement in such matters, for example, as the distillation of tar. Last, but not least, there was the education and training of the workmen and the engineers and chemists. These matters were all dealt with at conferences and in discussions in the Technical Press; and he expressed indebtedness both to the Technical Press and to such people as the manufacturers of appliances, who were endeavouring continually to introduce increasingly efficient appliances which were more attractive in appearance and were designed with a view to reducing labour.

THE PROFITS FOR THE YEAR.

The final account in connection with the revenue of the Company was the net revenue account, which showed that the profits for 1928 were a little more than those earned in the previous year. The Directors had placed £10,000 to the pension fund, thus repeating the 1927 contribution, and continuing the policy of building up that fund to an adequate sum to represent the Company's liability as calculated on actuarial advice. They had also placed £10,000 to reserve fund, that amount being rather more than the amount placed in that fund in 1927. This was permissible in view of the fact that they were not paying the full dividend that they might pay under the sliding-scale as it existed to-day. Another £10,000 had been placed to the renewal fund, as in the previous year, in order to build it up to meet the cost of some of the exceptional renewals to which he had referred. It was proposed to pay the same dividend as had been paid a year ago, and to add £8397 to the £14,681 carried forward in 1927, making the total carry-forward £23,078. He believed it would be agreed that this was a very satisfactory result from the point of view of the shareholders, and he did not think that on those figures, having regard to what the Company had done in respect of the price of gas, the consumers had any reason to complain.

GENERAL FINANCIAL POSITION.

Dealing with the general financial position as shown by the balance-sheet, he said the reserve fund, allowing interest earned by investments, had increased by £13,202 in the year. The insurance fund, after meeting the charges upon it, had increased by £531, and the renewal fund, after meeting the charges upon it, had increased by £7669. The pension fund stood at the very substantial total of £190,820. The reserve fund was invested to the extent of nearly half, the insurance fund to the extent of more than half, and the renewal fund to the extent of nearly half; and this was a policy it was proposed to extend still further as opportunity arose. It would be agreed that the Company's financial and trading position last year was satisfactory.

THE RECENT INCREASED DEMAND.

Discussing 1929, the Chairman said the result of the exceptionally cold weather experienced during the past few days had been that an exceptional and extraordinary demand had been made upon the Company for gas. From Jan. 1 to Feb. 14 inclusive sales had been increased by some 77 million c.ft., which was approaching double the entire increase of 1928 over 1927. During the last nine days the increased output had been 35 p.ct. During the last two days there had been an increase of 70 p.ct. on the sales made during the corresponding days of last year. As a result, the maximum day's consumption had increased to about 15·3 million c.ft., as compared with the previous record of about 13½ million c.ft. He mentioned those facts for two reasons. In the first place, they showed that the Company's policy of having satisfied consumers, of supplying consumers with large numbers of appliances, bore fruit in a period of severe weather, and it bore fruit in the sense that they were able to meet even such an exceptional demand as had been experienced in the last few days. The second reason was that this sudden increase of demand threw a very heavy strain upon the Company's engineers and all their workpeople and staff. The Engineer had stated that most of his assistants spent only one night out of three in bed during this severe period. Yet the Company had been able to fulfil the demand, and to fulfil it in a manner which he believed had been entirely satisfactory. All the men had been working well.

THE RE-ASSESSMENT OF THE COMPANY.

Another matter to which the Chairman referred was the re-assessment of property under the Valuation Act of 1925, under which all property had to be re-assessed, the new assessments coming into force on April 1, 1929. Gas undertakings, in common with the other public utility undertakings, had to be re-assessed. It was many years since the whole undertaking of the Croydon Company had been re-valued; the result was that a very substantial increase in the assessment was suggested, and the Directors had felt that an increase was inevitable. He was glad to be able to say, however, that the rating authorities had met the Directors of the Company in a very reasonable manner, and had allowed them to have discussions with the valuers. As the result of these discussions a figure was arrived at which the Directors felt was fair; but in order that they might be sure that they had not made a mistake, they had sought expert advice before concluding the negotiations, and were told that they had done quite well in getting the figure down to that which was ultimately agreed upon. He was happy to be able to say that agreement had been reached without any fight having taken place, and without the Company having to spend

a large sum of money in a contest, and the Directors had accepted provisionally a figure which was to go into the new rating valuation lists. Of course, the charge for rates on the Company in 1929 would be substantially increased. It was hoped that there would be some mitigation, due to the fact that values over the whole area had been increased, and, therefore, there should be some reduction in the rate payable per £1. He believed that in Croydon that was the anticipation which the rating authorities held out to the ratepayers.

Still another matter of a somewhat similar nature was the fact that the Company had received from the Corporation of Croydon notice to the effect that the latter desired to obtain a revision of the Company's standard price. In 1921, under the provisions of the Gas Regulation Act of 1920, the pre-war standard price was raised, the right being given to the local authorities to ask for the position to be reviewed at any time when costs of labour and materials were reduced. The Company were not in the least aggrieved that the Corporation were taking the action indicated, and he could assure the shareholders that the Corporation did not make the application for revision in any aggressive spirit. At present the sliding-scale, in a sense, was not working in the case of the Company—*i.e.*, they were not paying the dividend they were entitled to pay, but were paying what they considered to be reasonable, and because of that fact they were able to put £10,000 to reserve. Here, again, an opportunity to reach agreement has been given, and the Directors hoped they might be able to agree with the Corporation a figure which, subject to the approval of the Board of Trade, would represent a proper standard price. He could not discuss the matter further, however, because it was still *sub-judice*.

GOVERNMENT LEGISLATION.

Discussing the legislative position in regard to the industry, he said no doubt the shareholders had noticed in the Press that the National Gas Council and the gas industry generally had been asking for new legislation, in the sense that the existing legislation, some of which was very old, should be brought up to date. Unfortunately, however, owing to the pressure of work upon the Government, in the short time remaining to the present Parliament, it would not be possible to get anything like a comprehensive review of gas legislation; but the industry had received an assurance from the Government that, if a measure which was not controversial could be introduced, they would endeavour to get it through before this present Parliament came to an end. It was interesting to observe that the suggestions put forward on behalf of the industry were referred by the President of the Board of Trade to the National Fuel and Power Committee. This was a very important Committee appointed by the Board of Trade in 1926 to deal with such matters as were indicated by its title, and in the report of that Committee, which was laid before Parliament last month, it was stated with regard to the question of revision that,

> It has been represented to us that this method of adjustment of price to meet post-war conditions fails to take into account such factors as increased sales of gas, cost of obtaining capital, and cost of plant and other capital works,

and other matters of a like character. The Committee had also stated that,

> We recommend that steps be taken to amend this section of the Act—the Gas Regulation Act—so as to make it clear that an Order under the section shall not deprive an undertaking from benefits to which they would be entitled by reason of improved working or increased business.

That was a very satisfactory recommendation from the point of view of the industry generally. The only regret was that what the Committee had suggested was not an accomplished fact, so that it would affect the revision of the Croydon Company's standard price now anticipated. The Committee also stated that,

> We regard the principle of a minimum dividend as necessary to secure the confidence of investors and to protect shareholders from an undue fall of dividend when prices are required to be raised in cases of emergency.

If, said Mr. Cash, the Government could see their way at least to deal with those two matters in the non-controversial Bill they had in view, they would be conferring a benefit upon the industry and righting an injustice under which the industry rested. There were other matters which the Committee might deal with, such as the facilities for linking-up undertakings, for joint working and amalgamation, and the introduction of less stringent methods in connection with the issue of capital, all covered, of course, with proper safeguards from the point of view of the consumers. If the gas industry could get these matters put right and made easier, it would be indebted to the Government, and to the Board of Trade in particular. He did not think that the industry, in asking this, was asking for anything to which it was not entitled, and it was very glad to have the assurance of the Fuel and Power Committee that those requests were reasonable. The Chairman concluded by moving:

> That the report of the Directors and the statement of accounts for the year ended Dec. 31, 1928 (a copy of which has been sent to each proprietor), showing a balance of £65,220 8s. 10d. available for dividends, be and the same are hereby received and adopted, with the exception of the paragraphs relating to the declaration of dividends, the election of Directors and an Auditor, which are to be considered separately.

In asking Mr. Charles Hussey to second the resolution, the Chairman expressed regret that Mr. Thomas Rigby (Deputy-Chairman) was unable to be present, due to a severe cold. Mr. Rigby, however, was just as assiduous in his duties to-day as he had been during the whole of the time he had served the Company as a Director.

Mr. CHARLES HUSSEY, J.P., seconded the resolution, which was carried, without discussion.

DECLARATION OF DIVIDENDS.

The CHAIRMAN next moved:

> That dividends at the following rates per annum for the half-year ended Dec. 31, 1928:
>
> 7½ p.ct. on £120,000 redeemable preference stock,
> 5 p.ct. on £403,100 maximum dividend stock,
> 7 p.ct. on £787,560 sliding-scale stock,
>
> making, with the interim dividends declared by the Directors and paid on Sept. 1, dividends for the year at the respective rates of 7½ p.ct., 5 p.ct., and 7 p.ct., be now declared, and payable on March 31, 1929.

Mr. HENRY WOODALL, J.P., M.Inst.C.E., seconding, said he had been connected with gas-works all his life, and it was a very great pleasure always to go to the Croydon Company's works. As the Chairman had indicated, there had not been a very big increase in the sales of gas last year, but, owing to the great energy displayed by the Distribution Department, there was a very great sale of stoves and other gas appliances. The Directors knew very well that the time would come when those would be used, and it had arrived rather suddenly. They had been rather anxious to know that the demands for gas under such conditions would be properly met. The Engineer, Mr. Grogono, had taken charge of a very good works a short time ago, but had considerably improved them. Had the water gas plant not been completed, the Company would have had a good deal of trouble in meeting the demand, but not only had they met the demands, but they had been able to provide increased pressure, for, with this great demand, the ordinary pressures would not have sufficed. They had been able to do this and make up stock at the same time. This could only be done with a very efficient works; and the Croydon Company's works were a model of what a gas-works should be. The Company believed they would get even better results from the new intermittent vertical retorts now being installed than had been obtained from the existing retorts. The Directors, and he was sure the shareholders, were very pleased to know that the Company were served by such efficient officers, who were able so well to meet the very serious demands made upon them in the last few days.

The resolution was carried unanimously.

RE-ELECTION OF DIRECTORS.

Before the motion for the re-election of Directors was put, the CHAIRMAN recalled that at the previous meeting it was reported that Mr. William Russell had retired from the Board, after having served the Company for sixty years in various capacities. It was with regret that the Chairman now announced that Mr. Russell had died on Aug. 27, 1928. An expression of appreciation of Mr. Russell's services had been made a year ago, but the Chairman said he would not like the fact of Mr. Russell's death to be entirely unnoticed at this meeting.

The retiring Directors (Messrs. Thomas Rigby and Henry Woodall) were unanimously re-elected, the first on the motion of the CHAIRMAN, seconded by Mr. HUSSEY, and the second on the motion of the CHAIRMAN, seconded by Mr. PERCY H. HALL, J.P. In regard to Mr. Woodall, the Chairman mentioned his unrivalled experience of the gas industry. He was Deputy-Chairman of the Gas Light and Coke Company, Chairman of the British Gas Light Company, and Director of many others, and possessed special engineering qualifications; and it would have been a calamity had he not been re-elected to the Board.

ELECTION OF AUDITOR.

The CHAIRMAN said that the Board had received a letter from Mr. John Jones, one of the Auditors, who was retiring by rotation, to the effect that he did not desire to offer himself for re-election. Mr. Jones had served the Company well as Auditor for 35 years, and both proprietors and Directors would like to say how much they appreciated what he had done for the Company. Inasmuch as he had asked to be relieved of these duties, because he was getting older, there was no option but to allow him to go; but they would all wish him long life and health and strength to carry on his other duties. He was a Director of a number of companies. Notice had been received that Lieut.-Col. W. G. Smith, D.S.O., M.C., F.C.A. (Partner of Messrs. Cash, Stone, & Co., Chartered Accountants), would be nominated to fill the vacancy. The Chairman pointed out that he himself had retired from the firm of Cash, Stone, & Co. some two years ago; it would not have been proper, of course, that a partner of that firm should have been elected an Auditor of the Company if he (the Chairman) were still a partner and at the same time Chairman of the Company. The Directors would be glad to welcome Col. Smith, and felt that his experience would be of help to the Company. He (the Chairman) made those remarks without reflecting, of course, upon Mr. Frederick S. Sloman (an Auditor of the Company, who was also a Chartered Accountant).

Mr. BENJAMIN R. GREEN, after remarking that the Company parted with Mr. Jones with feelings of regret, proposed the election as Auditor of Lieut.-Col. Smith, who was admitted a member of the Institution of Chartered Accountants in February, 1914. Messrs. Cash, Stone, & Co., of which firm he was a partner, had an experience in the examination of gas accounts which was probably unrivalled, and Lieut.-Col. Smith held the position of Auditor to the Brighton and Hove Gas Company, and others. In addition to his qualifications as a Chartered Accountant, he had been a distinguished officer in His Majesty's Regular Army, and was awarded the D.S.O. and bar, and the M.C., in the war. The stockholders would realize the great importance of electing a fully qualified accountant, and one possessed of special knowledge of gas accounts and of the law under which gas companies operated. That Lieut.-Col. Smith possessed these qualifications there was no doubt whatever, and the Company were fortunate that his services were available.

The motion was seconded by Mr. F. J. HOLLINGSWORTH, and carried unanimously, and the CHAIRMAN congratulated Lieut.-Col. Smith upon his appointment.

Lieut.-Col. SMITH briefly returned thanks.

VOTE OF THANKS TO THE STAFF.

The CHAIRMAN said there was one resolution which was generally passed, and which he should be very sorry to omit on this occasion, and that was a vote of thanks to the officers, staff, and workmen. He had had the opportunity so frequently of saying how much they owed to their officers, staff, and workmen that it might sound like mere repetition; but the peculiar circumstances of the present time made it a little more important. The conditions of the last few days had provided a test of what the officers and workpeople could and would do. The General Manager and the Engineer had told him that the men had been working with excellent goodwill. Fitters had been sent for frequently by consumers in difficulties—stoves had been wanted in a hurry—the men at the works had been working really hard to get the quantity of gas through, and the staff had also been working overtime. That testimony was honest and thoroughly well deserved, and he was sure the proprietors would be glad to join him in expressing thanks. Mr. Grogono, the Engineer, had been very busy since he had joined the Company eighteen months ago, and the proprietors appreciated very much all he had done. At that time they had believed him to be a very well qualified engineer, but they now knew he was, and his experience and skill had been manifest both in regard to the installation of the new plant and in the manner in which the works were being conducted. There would be still further evidence of that when the new plant was working.

Mr. HAROLD WILLIAMS, O.B.E., F.S.I., seconded, and the vote of thanks was carried with acclamation.

Mr. WILLIAM J. SANDEMAN (General Manager), responding, said that this very kind vote of thanks would be appreciated by all. They were all very glad that the Chairman had such a very satisfactory report to place before the proprietors. It would be agreed that there could not have been such a good return but for the hearty co-operation of all the employees. The Company had an excellent staff, who had been tried very severely during the last few days, but none of them had failed their officers, and he did feel that the men were doing their very best in the interests of the Company.

VOTE OF THANKS TO THE DIRECTORS.

Mr. C. W. SIMMONS proposed a very hearty vote of thanks to the Chairman and his co-Directors for their services to the Company during the past year. He could not remember having heard a better address than the admirable and exhaustive one the Chairman had given, for it was such as would give the shareholders of any Company confidence as to what was taking place and what was to be undertaken in the future. The strain imposed upon the Directors of a Company of this size and importance was very great, and the shareholders should be proud to be served by such a Board.

Mr. BEARD seconded, and the resolution was carried with acclamation.

The CHAIRMAN briefly responded, and the meeting closed.

GAS COMPANIES' RESULTS FOR 1928.

A Year of Marked Progress.

ALTRINCHAM.

The report of the Directors of the Altrincham Gas Company for the year 1928 states that the profit shown by the revenue account is £13,247. The balance shown by the profit and loss account as available for dividend is £6781, which will provide for payment of the full statutory dividends, *less* income-tax, and leave a balance of £3135 to be carried forward. The sale of gas shows an increase on the previous year of 18,368,700 c.ft., equalling 5·08 p.ct. The price of gas was reduced by ½d. per therm as from the March quarter meter readings, and is now 8d. per therm, which is equivalent to 3s. per 1000 c.ft., subject to the usual discount of 5 p.ct.

CAMBRIDGE.

The General Meeting of the Cambridge University and Town Gaslight Company was held at the Company's offices on Feb. 12; Mr. J. F. Cameron (the Master of Gonville and Caius), Chairman of the Directors, presiding. The Chairman said that during the year they had made over 852 million c.ft. of gas, an increase of over 36 million c.ft., or about 4¼ p.ct. This increase would no doubt have been greater but for the mild weather of last autumn. Towards the end of the year the consumption on one day exceeded 3½ million c.ft., but even that record had been left behind since the new year began, not once, but many times. He learned that morning that the output on Feb. 11 exceeded 4 million c.ft. During the year there had been an increase in the number of ordinary meters of 432, and of slot meters of 307, making a total of ordinary meters of 10,348, and slot meters 8269. The appliances sold and fitted during the year were: Gas fires 1194, cookers 477, water heaters 238, or 1909 new appliances. Though naturally more coal had been carbonized, the coal bill was less by £4000; and, though more gas had been sold, the receipts from sales were down by £7500, for the reason that gas had been cheaper. Simultaneously with the fall in the price of coal, there had naturally been a fall in the price of coke, and the net receipts under this heading were down by £6400. The net receipts from tar had, however, increased by £2350. A payment of £3394 was made to the co-partnership scheme. This was the largest payment that had yet been made, and represented a bonus of 8¼ p.ct. Among the various extensions to the works a single item of this programme was the new gasholder. Without it they would have had only ten hours' storage at the maximum daily rate. With it they had 29 hours' storage—a much more comfortable position from which to meet an emergency. A new stove cleaning shop had been erected at the works, which enabled that work to be done more expeditiously and economically, and which relieved the pressure on Sidney Street. A garage had been built at the works, with proper accommodation for wagons and cars. Of the work still in progress, required to complete the 1924 programme, there was the extension of the railway sidings and an additional purifying house.

CARDIFF.

The Annual Ordinary Meeting of the proprietors of the Cardiff Gas Light and Coke Company was held at the Gas Offices, Bute Terrace, on Thursday, Feb. 14; Mr. Lawrence G. Williams, the Chairman of the Directors, presiding, supported by the other Directors. The Chairman said that the receipts from the sale of gas were down by £20,353, from which it would be seen that they had given the consumer in full measure the benefits obtained in cheaper coal, for it must be noted that the quantity of gas sold again showed an increase. That increase was roundly 2¾ million c.ft., or 10,476 therms. A special note was included in the Directors' report in reference to the service rendered to coin-meter consumers. This class of consumer was first catered for in 1903, and that the coin-meter was growing in popularity was indicated by the fact that to-day they had over 25,000 of these meters installed, and the gas used by these means in 1928 was some 630 million c.ft., or 2,960,000 therms. Over 4500 new gas appliances of a total value of £26,586 had been sold during the year, and a notable item in these figures was for 897 wash boilers, which were installed for domestic laundry work in preference to the old-fashioned coal-fired type of boiler. So far as the price of gas was concerned, it was gratifying that the reductions made in view of favourable coal contracts had permitted satisfactory trading results. The condition of the markets for residuals had caused the greatest anxiety, but they hoped that the exceptional position would be relieved in this direction immediately the exceptional causes of the depression disappeared. The bonus divisible among the co-partners remained at the same figure as last year, since it had been thought proper to transfer again this year a sum of £500 to the reserve fund, and the bonus was affected thereby. The employees were pleased last year to participate in this slightly increased distribution, and doubtless would be equally glad that the same bonus would be maintained this year. The Chairman then paid a tribute to the officials and staff, and congratulated Mr. H. D. Madden (Engineer and Manager) and Mr. R. J. Auckland (Secretary) upon the position to which they had brought the Company.

DERBY.

The Directors of the Derby Gas Light and Coke Company present the following report for the year ended Dec. 31, 1928: An interim dividend was paid on the ordinary stock for the June half-year of 3½ p.ct., and the payment is now recommended for the December half-year of a final dividend of 5 p.ct., making 8½ p.ct. (*less* income-tax) for the year. The Company's business continues to increase. There are 956 additional consumers, and the gas sold has increased by 87 million c.ft., being just over 5 p.ct. more than last year. Gas cooking stoves and fires sold or on hire are 3487 more, and there is also an increase of 1134 in other gas appliances for domestic and industrial purposes. The installation of vertical retorts at the Litchurch Works (referred to in last year's report) has been brought into operation, and fulfils expectations. In these accounts £30,165 has been charged against revenue for payments made on account of these vertical retorts and auxiliary plant, as they are replacements of disused plant. The issue of £50,000 ordinary stock by tender under the provisions of the Derby Gas Act, 1903, authorized at the extraordinary general meeting in February last, was oversubscribed and issued *pro rata* to the highest offers.

EAST SURREY.

The Directors of the East Surrey Gas Company submit the following report for the year ended Dec. 31 last: The figures include three months' trading of the Dorking undertaking, the Board of Trade having issued on Dec. 20. the "East Surrey Gas Order, 1928." The amalgamation with the Dorking Gas Company was thereby sanctioned on the terms approved by the stockholders at the extraordinary general meeting held for that purpose, and the name of the combined undertaking changed to the East Surrey Gas Company. The business of the Company continues to grow. The number of consumers supplied now exceeds 13,700. Under the powers granted to the Company in 1921, the Directors issued in March last £25,000 of 5½ p.ct. irredeemable preference "A" stock and £910 of 5 p.ct. debenture stock. Dividends at the under-mentioned rates per annum respectively—6 p.ct. on the cumulative preference stock; 5½ p.ct. on the preference "A" stock; and 5½ p.ct. on the ordinary "B" stock, all *less* income-tax—were paid for the half-year to June 30. The Directors recommend the payment of dividends at the following rates per annum: 6 p.ct. on the cumulative preference stock; 5½ p.ct. on the preference "A" and ordinary "B" stock respectively; together with dividends for three months ended Sept. 30 last at 10 p.ct. on the Dorking "A" and "B" shares, 7 p.ct. on the "C" shares, and 5 p.ct. on the "D" shares, with three months' dividend on the preference "A" stock issued in *lieu* thereof, all *less* income-tax.

EXETER.

The sale of gas by the Exeter Gaslight and Coke Company during the past year has again considerably advanced; the increase over the previous year being 66,521 therms, which equals just over 14 million c.ft. The whole of the new plant recently installed at the works has been put into operation during the past year, and in consequence considerably improved results have been obtained, which are reflected in the balance-sheet. The connecting-up with the Topsham consumers was completed in June last, and the business there already shows a substantial increase. The Directors recommend the payment of dividends for the year 1928 as follows: 10½ p.ct. per annum on the £40,000 original stock, and 7½ p.ct. per annum on the £83,000 new ordinary shares, both *less* income-tax.

GRANTHAM.

At the 109th half-yearly meeting of the Grantham Gas Company a dividend at the rate of 5 p.ct. per annum was declared. The sum of £1000 was transferred to the reserve, and £4900 was carried to the next account.

IPSWICH.

The Directors' report of the Ipswich Gas Light Company for the year ended Dec. 31, 1928, shows that after payment of the interim dividend at the statutory rates, and providing for interest and other charges, there is an available balance of £20,649. The Directors recommend the payment of a further dividend on the consolidated stock at the rate of 6¼ p.ct. per annum, and on the redeemable stock of 5 p.ct. per annum on March 1 next, making a dividend for the year of 6¼ p.ct. on the consolidated and 5 p.ct. on the redeemable stock. This will absorb the sum of £6701, and leave a balance of £13,948 to be carried forward. The price of gas was reduced on Jan. 1, 1928, to 9·2d. per therm, or 3s. 5·4d. per 1000 c.ft. There was an increase in the quantity of gas sold for the year of 111,509 therms, equal to 3·41 p.ct. Consumers to the number of 865 were added during the year, making a total of 23,079. During the latter part of the year the Company acquired by agreement the undertaking of the Woodbridge Gas Light and Coke Company, Ltd., and the purchase was approved by an extraordinary meeting of stockholders in November, and confirmed by a Special Order issued by the Board of Trade under the Gas Regulation Act, dated Dec. 20, 1928. A trunk main is being laid for the purpose of supplying Woodbridge from Ipswich, and the Directors believe that this linking-up will prove to be mutually satisfactory to both towns. They have already reduced the price of gas in Woodbridge by 6d. per 1000 c.ft. Steps are also being taken by the Company for the acquisition of the Felixstowe gas undertaking.

OXFORD.

The report of the Directors of the Oxford Gaslight and Coke Company for the year ended Dec. 31, 1928, is as follows: The Directors recommend payment of the full statutory dividend of 5 p.ct. per annum on the preference stock, and a dividend of 10 p.ct. per annum on the ordinary stock, for the half-year ended Dec. 31, 1928. This, with the interim dividend at the rate of 5 p.ct. per annum on the preference stock, and 10 p.ct. per annum on the ordinary stock, paid for the half-year ended June 30, 1928, makes 5 p.ct. per annum, and 10 p.ct. per annum, for the whole year on the two classes of stock respectively. The Directors have again to report a substantial increase in the consumption of gas during the year, and the demand for prepayment meters, gas fires, cooking stoves, and water heaters continues good. At the extraordinary meeting a proposal will be made for giving effect by means of a Special Order of the Board of Trade under section 10 of the Gas Regulation Act to a provisional agreement which has been entered into by the Directors for the acquisition of the undertaking of the Abingdon Gaslight and Coke Company, Ltd., and incidentally it is proposed to change the name of the Company to that of "The Oxford and District Gas Company" as being more appropriate to the extended operations of the Company. The Directors believe that such acquisition, by considerably enlarging the present area of supply, will make a sensible increase in the revenue of the Company, and at the same time materially benefit the consumers.

PORTSMOUTH.

Presiding at the ordinary general meeting of the Portsmouth Gas Company on Feb. 14, Mr. T. H. F. Lapthorn, J.P., the Chairman, stated that they had had an uneventful and satisfactory year. Expenditure of £44,061 on the capital account, apart from £6882 paid for new buildings and plant, was fairly evenly distributed over new mains, meters, and stoves, necessitated by the increase in their business. On the revenue account, the receipts from the sale of gas were down by £27,797, due entirely to two reductions of price made last year. Receipts from coke were less by £15,400, but more coke was used in making carburetted water gas, and they consequently had less to sell. The average price obtained for it was also down by 6s. 2½d. per ton. Less tar was made, but an increase of three-tenths of a penny in the price per gallon increased the receipts from that source by £1240. An increased profit of over £2100 was made on the fittings account. In regard to expenditure, coal and oil cost £39,786 less. They used 4174 tons of coal less, and 95,487 gallons of oil more. On an average, coal cost 5s. a ton less and oil nine-tenths of a penny per gallon less. Repairs and maintenance of works and plant went down from £91,000 to £72,000, the former figure including the value of the written off plant at the demolished Havant and Emsworth works. Repairs to meters cost £3569 more, and that figure might be expected to increase as the business expanded. The profit on the year's working was £77,761, as against £71,069 in 1927, an increase of nearly £6700; and there was a balance available for dividend of £69,339. The dividend would absorb £23,437, leaving a carry-forward of £45,902, or £6321 more than last year. During the year the number of meters in use in the district had been increased from 61,630 to 63,810. Cookers, fires, and radiators in use had also increased from 71,938 to 73,489. In addition, appliances of various kinds were sold to the number of 2247. The acquisition of the Havant and Emsworth undertakings had been very satisfactory to the Company; the sales of gas at Havant having increased since by 53 p.ct., and at Emsworth by 48 p.ct., while the consumers in those districts had also benefited by the reduction in price made. When the Company's original site at Hilsea of a little over 32 acres was bought nearly 29 years ago, they were making 900 million c.ft. of gas in a year. To-day, they were making three times that quantity, and in the last 10 years the increase had been over 60 p.ct. The Directors were recommending a slight increase in the dividend on the consolidated stock to bring it up to 8 p.ct., compared with 7½ p.ct. last year. This would give their 1040 stockholders an additional £2122 between them. The two reductions of price made last year were saving their customers £47,000 a year.

ROCHESTER.

Presiding at the Annual Meeting of the Rochester, Chatham, and Gillingham Gas Company on Feb. 15, Alderman E. W. Willis, J.P. (Chairman), stated that he did not propose to call attention to any particular item in the accounts, except to point out that the cost of coal, &c., during the year was less by £22,111, and in consequence of the reduced price the revenue from gas, in spite of increased sales, was less by £19,265, and the residuals produced £8409 less than the previous year. It must, therefore, be readily acknowledged that consumers had more than reaped the benefit of the lower manufacturing costs, which the Company had been called upon to pay. Leaving the balance-sheet, he desired to make a few remarks with regard to rating assessments. They were all aware that there had been a general revision of valuations throughout the country, and the result in the case of this Company was to increase the rateable value to approximately three times the present assessment. This was indeed a very serious matter, and rendered it impossible for the price of gas to be further reduced, as was the hope of the Board. Consumers of gas might, however, rest assured that there would be no increase in the charges to them if it was at all possible to avoid so doing. The Company had acquired land for the purpose of erecting offices and showrooms at Rainham. That area which, as they knew, was to be absorbed by Gillingham early in April, was one of considerable importance to this undertaking. It was developing very quickly, and the Directors felt, therefore, that consumers in that district should have additional facilities for obtaining information and apparatus in connection with gas and its many uses. The Directors would shortly be giving close attention to the matter of the redemption of the 8 p.ct. redeemable debenture stock issued in 1921. As soon as they had completed their deliberations and had formulated proposals, the proprietors would be asked to give their sanction to them. For some time past the Board had felt it desirable that a fund should be inaugurated providing for superannuation, when the time arrived, of those officials appointed by the Directors. A scheme covering those members of the staff, their widows, and children up to the age of 17, had been formulated and was put into operation as from Jan. 1, 1929. The Directors felt sure that this would receive the warm support of the proprietors. A dividend at the rate of 6½ p.ct. per annum on the consolidated ordinary stock, *less* income-tax, was paid in August last in regard to the half-year ended June 30, 1928, and the Directors recommended that a dividend at the rate of 6½ p.ct. per annum, on the consolidated ordinary stock, *less* income-tax, for the half-year ended Dec. 31, 1928, be declared and be payable forthwith. Mr. C. Valon Bennett (Engineer, General Manager, and Secretary), in reply to a vote of thanks to staff, said that those members of the staff to whom the superannuation scheme applied, because they did not come under the provisions of the health, unemployment, and pensions Acts, wished to tender their thanks to the Directors and stockholders for inaugurating this fund, which was on a contributory basis. The next point was that he wished, if possible, to ask consumers of gas to remember when they received their accounts in April next that they had had very severe weather in January and February. Gas during those months had been consumed in enormous quantities compared with last year, and therefore, when presented with their accounts, users would find large consumptions recorded. He trusted they would recognize they had received service for their money. He only said this because he realized that people soon forgot when the warm weather came that gas gave them warmth and comfort during the cold winter days.

SHEFFIELD.

The total quantity of gas sold by the Sheffield Gas Company during the past year was 4,983,896,000 c.ft., being an increase of 29,438,000 c.ft. on the previous year. Having regard to the conditions prevailing during 1928, the Directors consider this is satisfactory. During the past year the price of gas has been reduced from 6d. per therm to 6⅝d. per therm, a reduction equivalent to 1d. per 1000 c.ft. The price is now 6⅜d. per therm or 2s. 9d. per 1000 c.ft. for domestic supplies, with proportionate reductions to large consumers, the lowest price being 2⅜d. per therm, or 1s. per 1000 c.ft. An interim dividend at the rate of 6¼ p.ct. per annum was paid for the half-year ended June 30, 1928, and it is now proposed to pay a final dividend to Dec. 31, 1928, at the rate of 6¾ p.ct. per annum, making a total distribution for the year of 6½ p.ct. After the payment of these dividends there remains a balance of £83,294 to be carried forward to next year.

SOUTH STAFFORDSHIRE MOND.

The Directors' report of the South Staffordshire Mond Gas Company for the year ended Dec. 31, 1928, shows that the amount of fuel gasified during the year is 5½ p.ct. more than last year, but the cost of fuel gasified is 14 p.ct. less than for 1927. The gas distributed during the year is 3½ p.ct. more than during 1927. The gross profit for the year is £22,308, from which has to be deducted prior lien and debenture stock interest amounting to £12,916; leaving a net profit for the year of £9392. The sum of £14,023 has been brought forward from the previous year, which makes the amount of undivided profit standing to the credit of the profit and loss account at Dec. 31, 1928, £23,415. The Directors recommend that a dividend of 6 p.ct. for the year 1928 be paid, *less* tax, to holders

of cumulative preference shares. After paying preference dividend, the amount standing to the credit of profit and loss account is £18,465. The Directors recommend that a dividend of 1 p.ct. (*less* tax) be paid to all ordinary shareholders of the Company.

TOTTENHAM.

The Directors of the Tottenham and District Gas Company submit the following report for the year ended Dec. 31, 1928. After payment of dividends in respect of the half-year ended June 30, 1928, at the full statutory rates, all *less* income-tax, and providing for interest and the special charges set out in the profit and loss account, including the dividends now recommended, the accounts show a balance to be carried forward of £43,519. The Directors recommend the payment of dividends in respect of the half-year ended Dec. 31, 1928, at the rates of 5½ p.ct. per annum and 5 p.ct. per annum on the preference stocks; and £6 12s. 6d. p.ct. per annum on the ordinary stock. The dividend payable on the ordinary stock represents an increase over the year 1927 of 7s. 6d. p.ct. The Tottenham and District Gas Act, 1928, received Royal Assent on Aug. 3, 1928. The Act provides, *inter alia*, for the acquisition of the Waltham and Cheshunt Gas Company, the change of name of the Company, and the conversion of the "A" and "B" consolidated stocks into ordinary and preference stocks.

WINCHESTER.

The Directors submit the following report of the Winchester Water and Gas Company for the half-year ended Dec. 31, 1928. The balance of net revenue available for dividend, after transferring £250 to the reserve fund account, is £10,834, and the Directors recommend the payment of a dividend on the preference stocks at the rate of 4 and 5½ p.ct. per annum respectively, *less* income-tax, and on the consolidated ordinary stock at the rate of 5 p.ct. per annum, *less* income-tax, for the half-year. The sale of gas during the half-year has increased by over 3½ million c.ft., or 4 p.ct., over the corresponding half-year of 1927. The price of gas was reduced at Michaelmas to 11d. per therm—equivalent to 4s. 1½d. per 1000 c.ft.—and in addition substantial rates of discount have been granted to large consumers. Following the advice of the Company's Parliamentary Agents, the Directors resolved to promote a Bill in the current Session of Parliament, instead of applying for an Order under the Gas and Water Works Facilities Act, 1870. The promotion of the Bill was authorized unanimously by the stockholders present at the special general meeting held for the purpose on Jan. 22, 1929. The Bill was duly presented and read a second time in the House of Commons on Feb. 4.

MANCHESTER GASHOLDER ACCIDENT.

Special Committee's Report.

After a further long discussion by the Manchester City Council on Feb. 13, the subject of the disastrous explosion at the Bradford Road Gas-Works of the Manchester Corporation in August, 1927, was finally closed by the acceptance, with a small amendment, of the report of the Special Committee appointed at the January Council meeting to consider the Home Office report (see "JOURNAL" for Feb. 6, p. 366). This Committee in their report stated that they did not think that the Gas Committee were justified in attempting to throw blame on Mr. J. R. Hill, the then Acting Engineer, and considered that the Gas Committee must accept the report of the Government Inspector. That being so, the responsibility for working the gasholders concerned rested directly on the Gas Committee.

Alderman COOK, Chairman of the Gas Committee, said the Committee wished it to be clearly understood that they did not blame Mr. Hill for the accident. The report of the Special Committee was a biased one; the Committee being composed of opponents of the Gas Committee.

Councillor E. F. M. SUTTON said that in the Gas Committee's reply to the Home Office report there was a definite reflection on Mr. Hill; and this reflection must not be allowed to remain.

Councillor TOOLE, a member of the Gas Committee, moved that the whole report of the Special Committee be accepted with the exception of the portion stating that the Gas Committee was not justified in throwing the blame on Mr. Hill.

The Special Committee objected that this would still leave a reflection on Mr. Hill.

On Alderman WALKER'S suggestion, Councillor Toole altered his amendment to the deletion of the words "that being so, the responsibility for working the gasholders concerned rests directly on the Gas Committee," and the amendment was carried.

The Gas Committee have been instructed to report at the March meeting of the Council what steps they propose to take with regard to the appointment of a Chief Engineer, and to indicate what his functions are to be.

CONTRACTS OPEN.

Condensers.

The Gas Committee of the Penrith Urban District Council invite tenders for a set of annular condensers. [See advert. on p. 559.]

Liquor Plant Repairs.

The Warrington Corporation Gas Department invite tenders for the repair and overhauling of their concentrated liquor plant. [See advert. on p. 559.]

Retort Bench Extensions.

The Gas Committee of the Penrith Urban District Council invite tenders for retort bench extension. [See advert. on p. 559.]

Retort Setting.

The Skipton Urban District Council Gas Department invite tenders for the reconstruction of a through bed of eight retorts. [See advert. on p. 559.]

IMPERIAL CONTINENTAL GAS ASSOCIATION.

New Capital Proposals.

Notice has been given that the Imperial Continental Gas Association intend to ask leave to promote a Bill in the present Session of Parliament under the title of "A Bill to confer further powers on the Imperial Continental Gas Association; to repeal and re-enact with amendments the provisions of the several Acts governing the Association; and for other purposes."

It is stated that the main object of the Bill is to facilitate the raising of new capital in view of possible developments in the future; and the opportunity is being taken to consolidate into one Act the numerous Acts under which the Association carry on their undertaking.

A meeting of stockholders to sanction the promotion of the Bill is being convened for Thursday, Feb. 28.

TRADE NOTES.

The Lightest of the Common Metals.

The British Aluminium Company, Ltd., have issued a most attractive booklet entitled "The Lightest of the Common Metals," containing beautiful photographs to illustrate some of the many applications to which aluminium can be put in present-day manufactures. Aluminium is highly ductile and malleable, an excellent heat conductor, non-magnetic, free from rust or verdigris, non-toxic, resistant to sulphur and ammonia fumes and to many of the reagents used in chemical and textile processes, easily cleansed, and capable of many alternative finishes. The more generally known uses of the metal and its alloys are treated in separate publications, any of which, or other data concerning aluminium, will be furnished to those interested on application to the head office of the Company, Adelaide House, King William Street, E.C. 4.

The "Triumph" Mechanical Stoker.

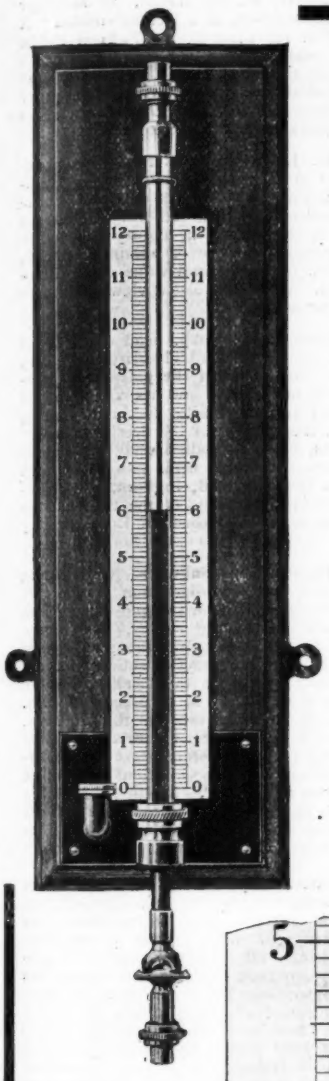
Triumph Stoker, Ltd., of Leeds, have published a pamphlet dealing with their "Triumph" mechanical stoker as improved with forced-draught furnace. The "Triumph" mechanical stoker was first introduced in 1898, since when many improvements have been effected in mechanical details. The stoker is of the sprinkler type, and the coal is thrown or sprinkled in small quantities over the fire by the automatic shovel at intervals of a few seconds, and no two successive charges fall in the same place. The result is a clear, bright fire of a uniform thickness of a few inches, allowing a proper admixture of the requisite amount of air with the gases given off by the fuel, thus ensuring perfect combustion without smoke, and consequently highest boiler efficiency with maximum steam production. The forced-draught furnace improves the combustion in cases where the natural draught is deficient, or where it is necessary to burn low-grade fuel.

Woodall-Duckham Continuous Vertical Retorts for Tokyo and Paris.

The Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., have received an order from the Tokyo Gas Company for an installation of Woodall-Duckham continuous vertical retorts with a gas-making capacity of over 8 million c.ft. per day. The carbonizing plant will consist of two benches, each containing twenty-two 103-in. retorts. The contract includes the supply of two waste-heat boilers and the necessary coal and coke handling plant. In addition, the Compagnie Générale de Construction de Fours are erecting two further installations of Woodall-Duckham continuous vertical retorts at the Clichy Gas-Works, Paris. One installation will comprise four batteries each of sixteen retorts, and the other four batteries each of twenty retorts; the two installations giving a total daily carbonizing capacity of 940 tons. This, together with the previous installation, will bring the daily carbonizing capacity in Woodall-Duckham retorts at Paris up to the figure of 1360 tons per day.

The Foster Economizer.

The modern catalogue tends to become more and more a compilation of valuable technical data. A high-class brochure just issued by Eco Power, Ltd., 15, Lincoln's Inn Fields, W.C. 2 (a subsidiary of E. Green & Son, Ltd., Wakefield), describing the Foster economizer, its construction and operation, is in this sense quite modern. A concise and instructive discussion on the economizer, its features and functions, as both a steaming and a non-steaming apparatus, is followed by a description of the construction, which comprises machined cast-iron gilled rings shrunk on to a solid drawn-steel tube. The calculation of fuel saving and the increase of boiler capacity by installing the economizer is briefly dealt with, and then follows an instructive section on induced draught. Dealing with the corrosion of tubes, the effect of velocity of flow is clearly illustrated by photographs relating to tests on corrosion by flowing water. The flow of fluids in smooth pipes is a further subject discussed, and then follow curves showing the weight of gases resulting from the complete combustion of coal and oil, and the relation between water temperature rise and gas temperature drop in an economizer for different ratios of weight of gases to evaporation. Tables of properties of saturated and superheated steam are further included, and the whole is copiously illustrated by excellent views of power stations in which the Foster economizer is in use. The brochure is thus not only interesting, but instructive.



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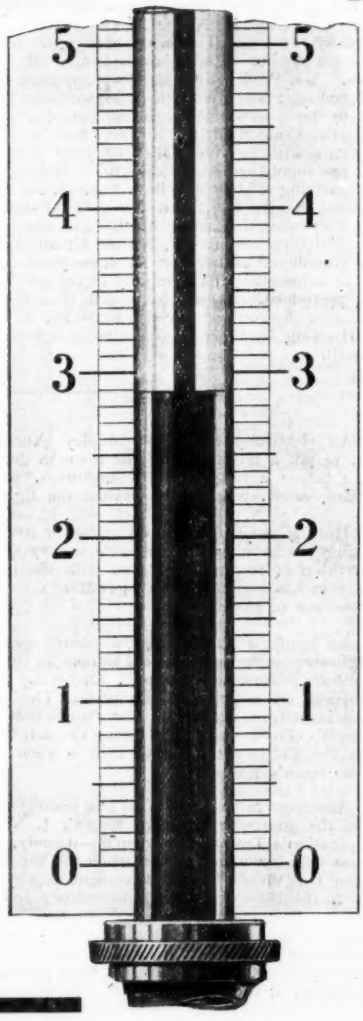

SINGLE GAUGES OR BATTERIES:

POLISHED WOOD OR IRON BACK.

ALEXANDER WRIGHT & CO., LTD. WESTMINSTER, S.W.1

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The cold spell during the past week has caused considerable disorganization in several ways. Shipping to many Continental ports is, of course, entirely held up, and boats which were expected back here for cargoes are frozen-in and detained. This has caused a shortage of tonnage, and troubles have been accentuated by the difficulty of teaming coal which is frozen in the wagons, and by a consequent shortage of empty trucks. On the other hand, the freezing of all the mid-European waterways has caused an acute shortage of coal in many parts of the Continent, so that the demand for English coal is very keen. Scandinavian ports, for instance, are offering enormous freights to shipowners who will risk cargoes to some of the better ports; but a large part of this demand is having to go unsatisfied at present.

Stocks are reported to be very low in many quarters, so that recent high prices are well maintained, and can be obtained for any free coal for the whole of March. Beyond that, however, the buyers are hesitating, though business is being done into April at quite good figures.

Large steam coals are still in most request, and best screened Northumberlands now ask 16s. 6d. f.o.b. Smalls are also scarce, and commanding 10s. Good gas coals are booking up well. Wear Specials are firm at 15s. 3d. to 15s. 6d., and best qualities at 15s. to 15s. 3d. Seconds quote 14s. 3d. to 14s. 6d. Coking coal is in keen demand for all early positions, and 14s. 6d. to 15s. 3d. is asked according to quality. Best Durham bunker makes are fully booked for some time ahead, and 15s. is obtainable for the whole of March. Other qualities are 14s. to 14s. 6d.

There has been a marked improvement in gas coke trade, and while the quotation has not advanced beyond 18s. 6d. f.o.b., there is more movement in the market than for some time.

YORKSHIRE AND LANCASHIRE.

There is nothing new to report this week in regard to the gas coal trade.

Industrial fuel generally maintains recent prices, and export conditions are rather more favourable.

The severe weather has retarded output. Collieries have found difficulty in working, especially those with washery plants. House coal demands have naturally been excessive, and delays in delivery are consequently bound to occur.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire—Hards, Association, bunkers 20s. 9d., export 18s. to 18s. 6d.; screened gas coal, export 16s. 9d. to 17s. 3d.; washed trebles, export 17s. 6d. to 18s.; washed doubles, bunkers 18s. 9d., export 16s. 9d. to 17s. 3d.; washed singles, export 15s. 9d. to 16s. 3d.; washed smalls, bunkers 15s., export 12s. 6d. to 13s.; rough slack, bunkers 13s. to 13s. 6d., export 10s. to 10s. 6d.; smithy peas, export 17s. 6d. to 18s. 6d.

West Yorkshire—Hartley's (f.o.b. Goole), bunkers 17s. 9d., export 16s. 6d. to 17s.; screened gas coal, export 16s. to 16s. 6d.; washed trebles, export 17s. to 17s. 6d.; washed doubles, export 15s. 6d. to 16s.; washed singles, export 15s. to 15s. 6d.; washed smalls, bunkers 14s. 3d., export 12s. to 12s. 6d.; unwashed trebles, export 16s. to 10s. 6d.; unwashed doubles, export 13s. 6d. to 14s.; rough slack, bunkers, 13s., export 10s. to 10s. 6d.; coking smalls, export 10s. to 10s. 6d.

Derbyshire and Nottinghamshire—Top hards, bunkers 20s. 9d., export 18s. to 18s. 6d.; cobbles, export 17s. 6d. to 18s.; washed trebles, export 17s. to 17s. 6d.; washed doubles, export 16s. to 16s. 6d.; washed singles, export 15s. to 15s. 6d.; washed smalls, bunkers 15s., export 12s. to 12s. 6d.; unwashed doubles, export 15s. to 15s. 6d.; rough slack, bunkers 13s. 9d., export 11s. to 11s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, bunkers 17s. 6d. to 18s. 3d., export 14s. to 15s.; gas coke, export 18s. 6d. to 22s.; furnace coke, export 19s. to 20s.; washed steam (Goole, West Yorks.), bunkers 17s. 9d.; (Hull, West Yorks.), bunkers 18s. 6d.; (Hull, South Yorks.), bunkers 18s. 9d., export 15s. to 15s. 6d.

MIDLANDS.

While severe weather has interfered to some extent with production, the interference with distribution has been more widespread. In all departments of the market there is pressure for supplies; the dislocation entailed by frost and snow coming at a time when demand has got on the up grade and the margin of reserves in consumers and intermediate hands is narrow.

Gas undertakings, called upon in many cases to meet an unprecedented demand, have been consuming stocks faster than they could be replaced when the weather was at its worst. Consequently, there has been an urgent call for old arrears on contracts to be overtaken and for current quotas to be kept up to the mark. On new business the collieries are asking an advance of 1s. upwards; but gasworks managements are not disposed to discuss long contracts now.

There is no more than sporadic revision of pithead prices. Some collieries have such a regular demand for their output that they are able to advance as much as half-a-crown, but that is very exceptional. In the distributive channel there is more room for the exploitation of local shortages.

Collieries in the Five-Counties Scheme are availing themselves of unused quota tonnage to increase their turnover. Some of them are getting as near to capacity output as they can, hoping apparently that the restriction may be further relaxed this month, and deeming it worth while to run the risk of forfeits.

Blast-furnace coke is being held for better prices; 14s. at ovens being quoted. Some furnacemen are yielding, and the iron market is contemplating a higher level of values.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 18.

There is little activity in pitch, and the price remains unchanged at 35s. to 36s. per ton.

Considerable business is being booked in road tar, and the low price ruling should result in an increased consumption. Other values are as follows:

Creosote, 6¾d. to 7d. per gallon.

Pure benzole, 1s. 9d. to 1s. 10d. per gallon; pure toluole, 1s. 11d. to 2s. per gallon; 95/160 solvent naphtha, 1s. 5d. to 1s. 6d. per gallon; and pyridine, about 4s. 3d. per gallon.

Tar Products in the Provinces.

Feb. 18.

The average prices of gas-works products during the week were: Gas-works tar, 21s. to 26s. Pitch—East Coast, 33s. 6d. to 34s. 6d. f.o.b. West Coast—Manchester, 28s. 6d. to 29s.; Liverpool, 30s. 6d. to 31s. 6d.; Clyde, 30s. 6d. to 31s. 6d. Toluole, naked, North, 1s. 5d. to 1s. 6d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid, 4⅝d. to 4¾d.; salty, 4¼d. to 4⅜d.; Scotland, 4½d. to 4⅝d. Heavy oils, in bulk, North, 8¼d. to 8½d. Carbolic acid, 60 p.ct., 1s. 10d. to 1s. 11d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10	to 0 11	per gallon at works
Motor ,, . . .	1 5	,, 1 6	,, ,,
90 p.ct. ,, . . .	1 7	,, 1 8	,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,,

European Gas Company, Ltd.—The Board have decided, subject to audit, to recommend a final dividend for the year 1928 at the rate of 7s. per share, making a total of 11s. per share, or 5½ p.ct. for the year, free of income-tax. The final dividend for 1927 was at the rate of 6s. per share, making a total of 10s. per share, or 5 p.ct. for the year.

Parkinson & Cowan, Ltd.—By a resolution passed at an extraordinary general meeting of Parkinson and W. & B. Cowan, Ltd., held on Jan. 9, and confirmed as a special resolution at a further extraordinary meeting on Jan. 25, the name of the Company has, with the approval of the Board of Trade, been changed, as from Feb. 11, to Parkinson & Cowan, Ltd.

Consolidated Gas, Electric Light, and Power of Baltimore.—The Directors have authorized the issue of 95,570 common shares of no par value to shareholders at $60 per share, present holders of every 10 shares having the right to take up one new share. A dividend on the common shares of 75 cents per share for the quarter ending March 31 has been declared.

Cheaper Gas for Cowes.—The Directors of the East Cowes Gas Company announce a reduction in the price of gas, which will take effect as from the date of reading the meters for last (Christmas) quarter, of ½d. per therm, making the price to be charged 10½d. per therm, or 4s. 1⅝d. per 1000 c.ft. As from the same date a corresponding cash rebate will be allowed to prepayment meter consumers.

Chadwick Public Lectures.—The Seventeenth Annual Series of Chadwick Public Lectures will start on Thursday, Feb. 21, at 5 p.m., at University Hall, Gordon Square, with a lecture on "Noise and the Public Health" by Dr. Dan Mackenzie, whose writings and speeches on the subject have already called public attention to the great need for reducing noise causes in our cities and suburbs. Sir James Crichton-Browne will preside.

Gas Chambers and Coke Ovens was registered as a public company on Feb. 11, with a nominal capital of £126,000 (360,000 preferred ordinary of 5s., and 360,000 deferred ordinary of 2s.) to construct, work, and deal in chamber and coke ovens, retorts, and other apparatus for coal carbonization, and to adopt an agreement with Bernhard Scholle & Co. for the sale to the Company of shares in Chamber Ovens, Ltd. The Directors are Messrs. B. J. M. Bebb (Director of Bernhard Scholle & Co.), A. H. Lymn, Chemical Engineer (Director of the Power Gas Corporation), N. J. Bowater, Chemical Engineer, and R. D. Cochrane (Director of the Bartholomew Investment Trust).

Survey of the Scottish Coalfield.—In anticipation of the completion within the next few months at Glenboig (Glasgow) of the large carbonizing plant devoted to the scientific treatment of coal by low-temperature distillation, the Bussey Coal Distillation Company has inaugurated an exhaustive analysis of coals taken from every coalfield in Scotland, with a view to selecting the most suitable type for giving a high yield of oil, gas, and smokeless fuel. This is the first complete scientific analysis of a nation's coal deposits ever undertaken. The whole of the Scottish coalfield has been surveyed, and chemists are now subjecting to standard tests over 200 widely differing varieties of coal from the "black" district extending from Edinburgh to Glasgow.

Lecture on Coal at Fulham.—Mr. W. M. Mason, the Manager of the British Commercial Gas Association, in a lecture entitled "A Lump of Coal," delivered on Feb. 14, 1929, in the Fulham Public Library, traced the fascinating constituents of coal, and made out a well-reasoned case for its scientific treatment in the gas-works, with the resultant economy of bye-products, and the blessing of a purer atmosphere. The lecture was illustrated with effective lantern slides dealing with various modern aspects of gas and coke service.

Boiler-House "Waste."—Mr. J. Roger Preston, in his presidential address to the Institution of Heating and Ventilating Engineers in London on Feb. 13, said there was still an enormous waste of heat due to badly designed boiler-house installations. Did it not seem extraordinary, he asked, in the twentieth century that when steam was generated for the primary purpose of obtaining power, often only from 5 p.ct. to 35 p.ct. of its thermal value was utilized and the rest deliberately wasted. With a broader view and more foresight the waste could often be avoided.

Leeds Fireclay Products.—Prof. J. W. Cobb, head of the Fuel Department of Leeds University, lectured at the University on Feb. 13 on the Leeds Fireclay Industry. He described the particular qualities of the fireclay usually found under coal and its value in the making of refractory bricks and furnace blocks for withstanding high temperatures. Speaking of the glazing of the fireclay to resist weathering and chemical reagents, he said Leeds fireclay had gained a wide reputation by the products of several firms associated with such well-known Leeds names as Holroyd, Cliff, Ingham, and Armitage. Prof. Cobb showed a number of exhibits of the clay and its products made at Leeds, and also some old records of Leeds fireclay firms.

Metropolitan Water Board Favours Pipe Subways.—On Feb. 15 the Metropolitan Water Board had under consideration a report of the Works and Stores Committee on the Holborn Explosion. "The general disturbance of the foundations of the streets," states the report, "has been so great that it was at one time thought possible that the opportunity would be taken to construct a subway for the numerous mains, pipes, and cables existing in the locality; but we regret to learn that such a work is not likely to be proceeded with. We are so impressed, however, with the importance of the provision, when opportunities occur, of suitable subways for the accommodation of underground mains and cables of the different statutory undertakers, that we have given instructions for representations to be made to the London County Council upon the subject. It will be necessary to renew the whole of the Board's mains and apparatus in the streets affected. We are strongly advised that owing to the unstable condition of the soil, steel pipes will have to be used instead of cast iron."

Gas v. Electricity at Oakengates.—A peculiar position has arisen respecting the lighting of 71 houses erected by the Oakengates Urban Council in Walton Avenue. The houses were among those provided by the Council several years ago, and up to the present they have no gas for lighting or heating; oil being used for both purposes. The Wellington Gas Company took over the Oakengates gas undertaking; and owing to varied causes gas mains have not been laid to the houses. With the advent of electricity supply in the district, the Council instructed the Clerk at a recent meeting to communicate with the West Midland Joint Electricity Authority, urging that the supply should be brought to Oakengates as soon as possible. At a meeting of the Council on Feb. 12, the Clerk (Mr. J. A. Holmes) reported that he had received a petition signed by 69 of the tenants that they were in favour of the gas supply being laid on; and a copy had been sent to Mr. Neville Chamberlain, Minister of Health. Mr. Woodhouse stated that for some years the Council had been trying to induce the Gas Company to lay on the supply, but the matter was postponed. As it was stated that the tenants of the houses were now desirous of having electricity, it was left in the hands of the Housing Manager to ascertain their views and report later to the Council.

An electricity failure at Shipley (Yorkshire) on the night of Feb. 14 put a large area of the town in darkness, and it was three hours before a large staff of engineers, working in darkness and freezing snow, was able to restore the lighting service.

During the long-continued frost in the Blackburn District gas-heating has been used for a wide variety of purposes, including the prevention of frozen pipes, &c., with the result that the daily consumption has increased from 4 million c.ft. to nearly 5 millions for this season of the year.

An immediate threat to the town's gas supply was involved in a lightning strike of 1400 coal miners at the Mitchell Main Colliery, Wombwell, Yorkshire, on Feb. 12, owing to two men having been dismissed on a point of discipline. The town secures its gas in crude form from the colliery for distribution from the Urban District Council's Gas-Works. The Urban Council immediately got into touch with the Colliery Company, with a view to ensuring continuance of the town's gas supply.

A change in the system of gas testing at Portsmouth is referred to in the quarterly report of Mr. C. J. Vine, Chief Officer of the Corporation's Testing Department—namely, the continuous recording of the calorific value of the whole of the gas distributed from the Hilsea Gas-Works by an instrument approved by the Gas Referees. This is the Boys recording calorimeter; and in his report Mr. Vine says: "This instrument is being provided by the Portsmouth Gas Company at a probable total cost of £300, and will supersede the calorimeter at the Milton testing station. By the courtesy of the Company an excellent room has been placed at my disposal for the installation of the recorder."

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Shares.	When ex-Dividend.	Dividends, Prev. Hf.Yr.	Dividends, Last Hf. Yr.	NAME.	Quotations. Feb. 15.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,378	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C.	70—75*	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	73—76*	..	..
1,551,868	,,	Sept. 27	7	7½	Alliance & Dublin Ord.	99—102	..	100½—101
374,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	63—66	..	..
522,554	,,	Aug. 30	7	7	Barnet Ord. 7 p.c.	114—117	..	115½—116½
800,000	1	Oct. 11	1/7½	1/4½	Bombay, Ltd.	20/—22/-	..	21/—22/-
172,500	10	Aug. 30	8½	8½	Bournemouth 5 p.c.	12½—13½	..	13½—13⅝
800,050	10	,,	7	7	Do. B 7 p.c.	12½—13	..	12⅝—12⅞
439,160	10	,,	6	6	Do. Pref. 6 p.c.	11—11½	..	..
50,000	Stk.	Jan. 10	3	3	Do. 3 p.c. Deb.	66—68	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
357,900	,,	Aug. 30	7½	7½	Brighton & Hove 5 p.c. Con.	115—118	..	..
341,880	,,	,,	6¾	6¾	Do. 5 p.c. Con.	101—104	..	..
1,287,500	,,	July 26	5	5	Bristol 5 p.c. max.	93½—94½a	..	..
855,000	,,	Sept. 27	7	8	British Ord.	116—119	..	117½
100,000	,,	Dec. 20	7	7	Do. 7 p.c. Pref.	115—120	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	73—76	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	93—96	..	..
100,000	10	Dec. 6	8	6	Cape Town, Ltd.	8—9	..	..
100,000	10	Oct. 25	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	6½—£7/0/9
150,000	Stk.	Dec. 20	4½	4½	Do. 4½ p.c. Deb.	73—78	..	..
626,860	,,	July 26	6	6	Cardiff Con. Ord.	97—100	..	..
927,860	,,	Jan. 10	7½	7½	Do. 7½ p.c. Red. Deb.	98—101	..	..
157,150	,,	Aug. 16	5½	5	Chester 5 p.c. Ord.	90—95b	..	..
79,185	1	Oct. 11	†2/-	†3/-	Colombo Ltd. Ord.	36/—38/-	..	37/3—38/-
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	21/—23/-	..	..
375,403	1	Oct. 11	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/6—26/6	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-	..	..
2,073,280	Stk.	July 26	7	6	Commercial Ord.	100—103	..	100½—101
475,000	,,	Dec. 20	3	3	Do 3 p.c. Deb.	56—59	..	59
600,000	,,	Sept. 27	11	11	Continental Union, Ltd.	120—125	+3	115—126
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	120—125	+2	119—130
787,560	,,	Aug. 16	7	7	Croydon sliding scale	111—114	..	112
403,100	,,	,,	6	6	Do. max. div.	84—87	..	..
542,270	,,	Aug 16	10	7	Derby Con.	115—120c	..	..
55,000	,,	Dec. 20	4	4	Do. Deb.	70—72c	..	..
909,000	,,	Aug. 30	5	5	East Hull Ord. 5 p.c.	75—78	..	..
1,002,180	10	Sept. 13	†6	†4	European, Ltd.	15—17	..	15⅞—16⅝
15,708,480	Stk.	July 26	5/1/4	5½	Gas Light & Coke 5 p.c. Ord.	19/4½—19/10½f	—/6½	19/6—20/3
2,500,000	,,	,,	8½	8½	Do. 8½ p.c. max.	65—67	..	64½—66½
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	78—81	—1	79½—80½
5,609,630	,,	Dec. 20	3	3	Do. 3 p.c. Con. Deb.	58—61	—½	59½—60½
181,315	,,	,,	6	6	Do. 6 p.c. Br'd'd Rd. Db.	102—105	..	..
3,842,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	98—101	..	101½
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Aug. 30	6½	7	Hastings & St L. 5 p.c. Conv	96—100	..	..
288,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	75—80	..	76½
10,000	10	Oct. 11	†10	†10	Hongkong & China, Ltd.	13—14	..	..
173,200	Stk.	Aug. 30	5	5½	Hornsey Con. 5½ p.c.	88—91	..	..
1,976,000	,,	Nov. 8	10	10	Imperial Continental Gas.	390—410	—10	387—420
228,130	,,	Feb. 7	8½	8½	Do. 8½ p.c. Red. Deb.	69—72*	..	..
325,242	,,	Aug. 16	7	7½	Lea Bridge 5 p.c. Ord.	120—123	..	..
2,145,907	,,	Aug. 16	5½	5½	Liverpool 5 p.c. Ord.	92½—93½b	+1½	..
600,000	,,	Sept 27	7	7	Do. 7 p.c. Red. Pref.	101—103b	..	..
165,786	,,	Aug. 16	8	9	Maidstone 5 p.c. Cap.	124—129	..	127
63,480	,,	Dec. 20	3	3	Do. 3 p.c. Deb.	54—57	..	54—55
75,000	5	Dec. 6	†8	†8	Malta & Mediterranean	5¾—6¼	..	..
392,000	—	—	—	—	Metrop'n (of Melbourne) 5½ p.c. Red. Deb.	100—103	..	101½
841,920	Stk.	Nov. 22	†7	†6	Montevideo, Ltd.	97—100	..	..
2,061,315	,,	Aug. 16	5	5	Newcastle & Gateshead Con.	17/3—17/9df	—/3	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	74—75d	..	..
691,705	,,	Dec. 20	3½	3½	Do. 3½ p.c. Deb.	68—69d	..	..
181,780	,,	Aug 30	6/18/0	7/1/0	North Middlesex 5 p.c. Con.	102—107	..	..
800,000	,,	Nov. 22	7	9	Oriental, Ltd.	116—120	..	..
188,130	,,	Dec. 20	7½	8	Plym'th & Ston'house 5 p.c.	108—111	..	..
424,416	,,	Aug. 30	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	115—120	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	83—86	..	..
2,334,464	1	—	—	—	Primitiva Ord.	27/6—29/6	+1/-	26/9—28/9
244,500	100	Dec. 8	4	4	Do. 4 p.c. Red. Deb.	91—94	..	..
695,000	Stk.	Jan. 24	4	4	Do. 4 p.c. Red. Deb. 1911	78—80*	..	..
416,345	,,	Dec. 20	4	4	Do. 4 p.c. Cons. Deb.	78—80	..	..
150,000	10	Sept. 27	6	6	San Paulo 6 p.c. Pref.	8⅞—9⅛	..	..
1,736,968	Stk.	Aug. 30	—	—	Sheffield Cons.	105—107e	..	..
95,000	,,	Jan. 10	—	—	Do. 4 p.c. Deb.	74—77e	..	..
90,000	10	June 14	:3	14	South African	4—6	..	..
6,609,895	Stk.	July 26	7½	5	South Met. Ord.	108—110	..	108½—109½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	110—113	..	..
1,895,445	,,	Jan. 10	3	3	Do. 3 p.c. Deb.	59—61	..	60—61
784,000	,,	Sept 13	6½	6½	Do. 6½ p.c. Red. Db.	101—103	..	101½
91,500	,,	Aug. 16	8½	8½	South Shields Con.	109—110d	..	..
1,543,795	,,	July 26	6½	6½	South Suburban Ord. 6 p.c.	109—112	..	..
468,887	,,	Dec. 20	5	5	Do. 5 p.c. Deb.	98—101	..	..
647,740	,,	Aug. 30	5	5	South'mpton Ord. 5 p.c. max	77—79	..	77½
121,275	,,	Dec. 20	4	4	Do. 4 p.c. Deb.	72—75	..	..
350,000	,,	Aug. 30	7	7	Swansea 7 p.c. Red. Pref.	101—103	..	..
300,000	,,	Dec. 20	6½	6½	Do. 6½ p.c. Red. Deb.	99—101	..	..
1,002,275	,,	—	—	—	Tottenham District Ord.	102—105	+1	..
150,000	,,	July 29	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
181,358	,,	Dec. 6	4	4	Do. 4 p.c. Deb.	75—78	..	..
239,094	,,	Aug. 30	6⅞	6⅞	Uxbridge, Maidenhead, & Wycombe 5 p.c.	93—98	..	..
98,880	,,	,,	5	5	Do. 5 p.c. pref.	87—92	..	..
80,000	,,	July 12	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	145—150	..	146
355,686	,,	,,	7	7½	Do. B 3½ p.c.	127—132	..	129
493,525	,,	,,	5/19/0	6½	Do. C and New	103—108	..	..
353,000	,,	,,	6⅝	6⅞	Do. Wimbledon 5 p.c.	117—122	..	118—120
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	130—135	..	134
200,000	,,	,,	5	5	Do. 5 p.c. Pref	90—95	..	..
88,416	,,	Dec. 20	3	3	Do. 3 p.c. Deb.	57—60	..	..
384,748	,,	,,	4	4	Do. 4 p.c. Deb.	77—80	..	..
207,500	,,	,,	5	5	Do. 5 p.c. Deb.	97—100	..	..

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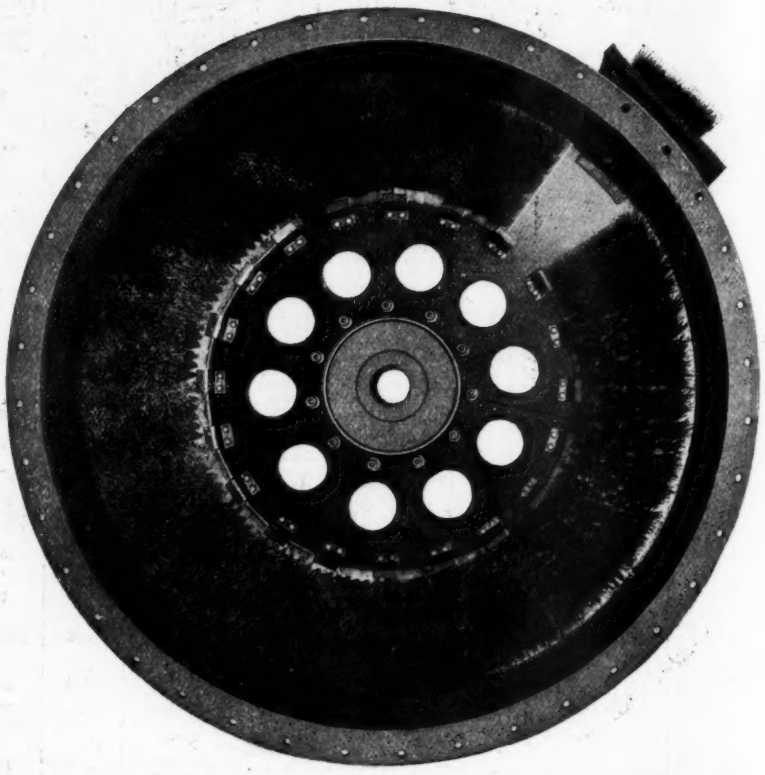

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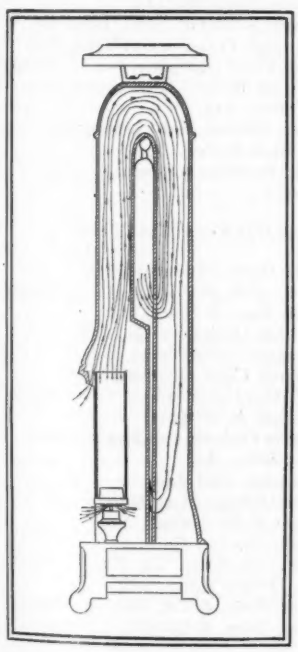

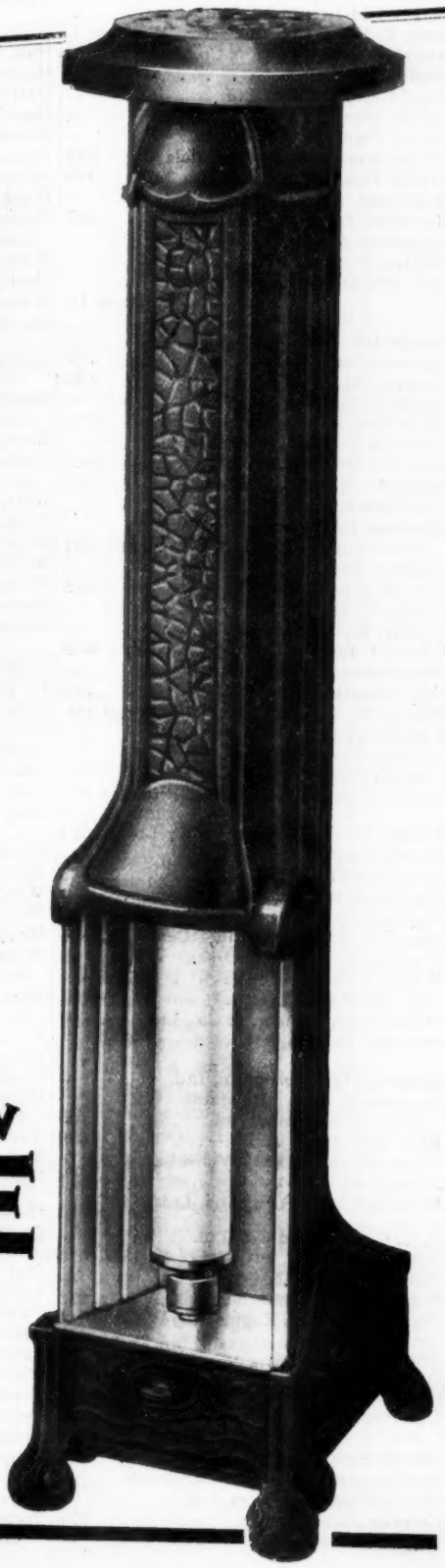

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McKelvie, James, & Co.	Wrapper I.
Mewburn, Ellis, & Co.	624
Midland Flexible Metallic Tubing Co., Ltd.	—
Midland Railway Carriage and Wagon Co., Ltd.	Wrapper IV.
Midland Tar Distillers	—
Mitchell, H.	—
Mobberley & Perry, Ltd.	—
Moore, Walter, & Sons	Wrapper I.
Nautilus Fire Co., Ltd.	—
New Conveyor Co., Ltd.	629
Newton Chambers & Co., Ltd.	581
Orme, George, & Co.	—
Oughtibridge Silica Firebrick Co.	575
Parkinson Stove Co., Ltd.	Centre X., XI.
Parkinson, W., & Co.	588, 627
Patent Retorts, Ltd.	630
Pearson, E. J. & J., Ltd.	—
Peckett & Sons, Ltd.	629
Peebles & Co., Ltd.	580
Penney and Porter, Ltd	—
Perfecta Meters, Ltd.	—
Phillips, J. W. & C. J., Ltd.	626
Piggott, Thos., & Co., Ltd.	—
Pocock, Herbert	—
Pollard Engineering Co., Ltd.	—
Potterton, T. (Heating Engineers), Ltd.	—
Premier Gas Engine Co., Ltd.	—
Pulsometer Engineering Company	Wrapper IV.
Purimachos Ltd.	—
Quasi-Arc Co., Ltd.	—
Radiation Ltd.	585, Centre IV., V.
Reavell & Co., Ltd.	630
Renold, Hans, Ltd.	575
Richmond's Gas Stove Co., Ltd.	—
Riley, A. J., & Son, Ltd.	—
Riley, John, & Sons, Ltd.	—
Robinson, J. H., & Co. (Liverpool), Ltd.	—
Ross, Chas., Ltd.	624
Rotary Meter Company, Ltd.	—
Rotherham and District Collieries Association, Ltd.	626
Ruscoe, John, & Co., Ltd.	628
Sankey, J. H., & Son, Ltd.	—
Sawer & Purves	Centre VIII.
Scottish Tube Co., Ltd.	631
Sheepbridge Coal & Iron Co., Ltd.	Wrapper IV.
Siebe, Gorman, & Co., Ltd.	—
Smith Meters, Ltd.	—
Smith, S., & Sons (M.A.), Ltd.	579
Solent Engineering Co., Ltd.	—
South Metropolitan Gas Company	628
Spencer-Bonecourt, Ltd.	Centre IV.
Spencer Chapman & Messel, Ltd.	624
Spencer, W., & Sons (Southall)	626
Stanton Ironworks Co., Ltd.	Centre III.
Staveley Coal and Iron Co., Ltd.	573
Stein, J. G., & Co., Ltd.	Wrapper I.
Stewarts and Lloyds, Ltd.	Wrapper I.
Strachan & Henshaw, Ltd.	571
Stringer Bros.	—
Sugg, Wm., & Co., Ltd.	—
Super-Centrifugal Engineers, Ltd.	—
Sutherland Meter Company, Ltd.	—
Taylor, Joseph (Saturators), Ltd.	628
Thames Bank Iron Co., Ltd.	—
Thermal Syndicate, Ltd.	—
Tilghman's Patent Sand Blast Co.	—
Tilley High Pressure Gas Synd., Ltd.	572
Torbay Paint Company, Ltd.	Wrapper I
Town Gas Boilers (Bonecourt), Ltd.	—
Trier Bros., Ltd.	—
Trotter, Haines, and Corbett, Ltd.	628
Tully Sons & Co.	632
Turner Brothers Asbestos Co., Ltd.	—
Turner, F.	—
Vertical Gas Retort Synd., Ltd.	630
Wailes Dove Bitumastic, Ltd.	574
Walker, C. & W., Ltd.	Centre IX.
Waller, Geo., & Son, Ltd.	573
Waterless Gasholder Co., Ltd.	—
Wellington Tube Works, Ltd.	—
Welsbach Light Company, Ltd.	—
West's Gas Improvement Co.	Centre XII.
Westwood & Wrights	—
Whessoe Foundry and Eng. Co., Ltd.	—
Willey & Co., Ltd.	—
Williamson, Cliff, Ltd.	—
Wilson (George) Gas Meters, Ltd.	628
Wilsons & Mathiesons, Ltd.	—
Wonder Washer Co.	—
Woodall-Duckham Co., Ltd.	Centre I.
Wood, Hugh, & Co., Ltd.	—
Wright, Alex., & Co., Ltd.	Centre VII.
Wright, John, & Co.	—

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